International Workshop

on

Keeping Schools Safe from Earthquakes

1-2 June 2006, Kathmandu, Nepal

Organized by

United Nations Center for Reginal Development (UNCRD)

National Societey for Earthquake Technology - Nepal (NSET-Nepal)

In association with

Department of Education, Ministry of Education, Government of Nepal

UN Secretariat for International Strategy for Disaster Reduction (UN ISDR)

National Graduate Institute for Policy Studies (GRIPS), Tokyo, Japan

Kyoto University, Kyoto, Japan

Content

Acknowledgement

Foreword

Mission Statement of UN/DESA

The Department of Econoomic and Social Affairs (UN/DESA) was created as the result of the consolidation of the Department of Policy Coordination and Sustainable Development, the Department for Economic and Social Information and Policy Analysis, and the Department for Development Support and Management Services.

UN/DESA is a vital interface between global policies in the economic, social and environmental spheres and national action. The Department works in three main interlinked areas: (a) it compiles, generates and analyses a wide range of economic, social and environmental data and information on which States Members of the United Nations draw to review common problems and to take stock of policy options; (b) it facilitates the negotiations of Member States in many intergovernmental bodies on joint courses of action to address ongoing or emerging global challenges; and (c) it advises interested Governments on the ways and means of translating policy frameworks developed in United Nations conferences and summits into programmes at the country level and, through technical assistance, helps build national capacities.

Inaugural Session

Welcome Speech — *Amod Dixit*
Executive Director, National Society for Earthquake Technology-Nepal (NSET-Nepal)

Opening Remarks — *Kazunobu Onogawa*
United Nations Centre for Regional Development (UNCRD)

Message — *Mangal Siddhi Manandhar*
Honorable Minister of Education and Sports, Government of Nepal

Message — *Salvano Briceno*
Director, UN Secretariat for International Strategy for Disaster Reduction (UN ISDR)

Inaugural Speech — *Ram Sarobar Dubey*
Acting Secretary, Ministry of Education and Sports, Government of Nepal

Welcome Speech

Amod Dixit
Executive Director, National Society for Earthquake Technology - Nepal (NSET-Nepal)

Good Morning. NSET is privileged to be able to work together with the United Nations Center for Regional development (UNCRD) to organize this workshop in association with the Department of Education, of Nepal Government's Ministry of Education and Sports, as well as with the Graduate School for Policy Research and Kyoto University of Japan.

And I extend our collective welcome to all of you gathered here in this opening ceremony and also to the participants of the 2-day workshop. My special words of welcome go to the representatives of Fiji, India, Indonesia, and Uzbekistan, who have traveled long distances to come here to share their experiences on making schools safer against earthquake and to collectively chart out programs for future.

I also welcome our Chief Guest, and the representatives of various government agencies working in aspects, Diplomatic Community, international institutions and UN system, and the bi-lateral agencies. Obviously all of you are interested in aspects of safety of schools against natural hazards, and your presence here witnesses the growing interest to ensure safety of our future generations. I salute you all, especially on this day which is the International Day for Protection of the Child.

NSET's association with UNCRD dates back to 1999, when during a Regional meeting in Bangkok to mark the end of the International Decade for Natural Disaster Reduction, the two institutions decided to join hands to work for enhancing earthquake safety of schools. The Disaster Management Planning Office of UNCRD was established on that very year, which was also the year when NSET's works started being recognized outside Nepal and we entered into a partnership with the US Office of Foreign Disaster Assistance (OFDA) who have been helping us in concept development and implementation of School Earthquake Safety Program (SESP) since then.

Thus, the association of UNCRD and NSET is also long and time-tested, and we have been able to gather wider international buy-in for the School Earthquake Safety Program, and we have a lot to be jointly proud of, and therefore I am especially happy

Photo. Amod Dixit

to extend the traditional Nepalese welcome words of Namaste and Swagat to the Director of UNCRD, Dr. Kazunobu Onogawa. Together with our welcome, we also would like to thank Dr. Onogawa for being one of the very early ones to start the efforts of integrating Disaster Risk Reduction issues with Development and for looking the issue with a regional perspective.

I would like to express our welcome also to Prof. Kenji Okazaki, who has influenced the issues of disaster risk reduction in the developing countries earlier as the Director of the United Nation's RADIUS project, or later, in the capacity of the Coordinator of the Kobe office of UNCRD and the main architect of the GESI Project. A long friend of NSET, he was one of the early ones to have encouraged us and to join hands with us in propagating the importance of School Earthquake Safety.

The School Earthquake Safety program of NSET grew out gradually as the response to the challenge expressed by the people of Nangkhel of Bhaktapur, where a dilapidated school building in bricks and mud mortar was found to be extremely unsafe structurally. No one that time imagined that the program thus initiated by NSET, with virtually without a single rupee at hand, could grew into a program with a mission mode, which not only provided a model for improvement of seismic performance of public schools in developing countries, but also helped to

develop programs such as Mason training, Shaking Table Demonstration, Earthquake Clinics, Seismic Vulnerability Tour, and so on, which collectively earned NSET the United Nation's Sasakawa Award in 2001 and the Tech Award of the Tech Museum of San Jose.

The workshop will sit in five sessions. This Opening Ceremony will end with an Earthquake Safety song written by the Nepalese Poet-Laureate Madhav Prasad Ghimirey, and the music is given by the doyen of Nepalese Music Mr. Amber Gurung. The song is being translated into English also, but will be sung in its Nepalese version by the students of Shree Saraswoti Secondary School, Thecho and Shree Bal Vikash Secondary School, Alapot.

Subsequent session will be devoted to first to background papers by invited speakers, which will be followed by the session on country presentations. In the afternoon session, the participants will discuss on three main issues of school earthquake safety, namely, a) School safety and public policy, b) Technology for assessment and school retrofitting/ design, and c) Disaster education, awareness and training, and develop consensus document which will form the basis of a resolution to be adopted the next day.

The findings of the group discussion will be discussed in Plenary in the afternoon of tomorrow, after the participant would have visited two of the public school and interacted with the community who takes care of the school. The Plenary will also adopt a resolution based on the earlier discussion.

I request all of you to attend the full two day of the workshop – partial attendance will bring only partial benefit. However, we do understand that not everybody may devote the time, and have delegated their representatives for the workshop. However, for logistics reasons, we need to ensure that we know who will continue for the entire workshop and who wants to take part in the visit to the school. So we will be providing you with sheets to register yourselves again for the workshop and also for the filed trip.

Thank you.

Opening Remarks

Kazunobu Onogawa
Director, United Nations Centre for Regional Development (UNCRD)

Mr. Ram Sarobar Dubey, Secretary of the Ministry of Education and Sports, all government agencies from the Government of Nepal, Mr. Shiba Bahadur Pradhanang, President of National Society for Earthquake Technology Nepal (NSET), Prof. Kenji Okazaki, the National Graduate Institute for Policy Studies, Tokyo, Japan (GRIPS), distinguished participants, colleagues of UN and international organizations and ladies and gentleman, I wish you all a very good morning and a warm welcome to the International Workshop on Keeping Schools Safe from Earthquakes.

First of all, I would like to express my sincere appreciation to NSET, which has made possible for us to have this international workshop at this historical city Kathmandu with the participation of representatives from Asia and Pacific countries. Also my appreciation goes to the Ministry of Education and Sports of the Government of Nepal for its support to organize this workshop.

Ladies and Gentleman,

We have heard sad news again that the earthquake in Yogyakarta, Indonesia killed more than 5,000 people because of the destruction of their residences. It is reported that collapse of the house walls was again the main reason of this tragedy. International community is starting to provide its assistance to the people of Yogyakarta, but the lives of the people lost by this disaster cannot come back. That is why United Nations Centre for Regional Development, UNCRD, puts more importance on the disaster preparedness rather than remedial actions taken after occurrence of disasters.

In developing countries, approximately 30% of the population falls in the age group of 6 to 18 years, and these children are the most vulnerable group against the earthquakes. In Pakistan, on October 8, 2005, earthquake on a Saturday school morning claimed the lives of 18,000 children as they sat in their school classrooms that were not built to withstand earthquakes. Some of the villages in Kashmir, Pakistan are now deprived of age group 6-12 since they lost entire school-going children in the earthquake.

Photo. Kazunobu Onogawa

We know well that the earthquake threatened communities need earthquake resistant schools to protect the lives of the children. Further, strongly built schools can be also used as relief and rehabilitation shelters after earthquakes. Strong leadership of teachers has been proven to be very effective in dealing with emergency situations in disaster-prone countries, and by raising awareness among children, the message can reach their families, and further, the "culture of mitigation" can be spread through the communities.

Schools play a crucial role in community training and building social capital. UNCRD is promoting the School Earthquake Safety Initiative (SESI) since 1999 when our Disaster Management Planning Office was established in Hyogo, the venue of the World Conference on Disaster Reduction in January 2005, which adopted the Hyogo Framework for Action.

We have started also a project "Reducing vulnerability of school children to earthquakes" since last year, using the Human Security Trust Fund of UN-OCHA, donated by the Government of Japan, with

two focuses (1) developing and transferring earthquake retrofitting technologies for school buildings, and (2) promoting education in relation to disasters. This project covers four countries in the Asia and Pacific region, namely, Uzbekistan, India, Indonesia and Fiji as demonstration cases with the expectation of dissemination of the activities throughout the respective geographical regions.

This project facilitates the on-site implementation of a capacity building programme on earthquake disaster mitigation for technicians, teachers and communities.

We are also carrying out the Community Based Disaster Management Project since the establishment of our Hyogo Office. It is because we strongly believe that the real improvement of the society can be achieved only when the people of communities are truly involved in the activities with well understanding of the necessity of preparedness for the disasters.

Ladies and gentleman,

Through these activities, UNCRD is trying to contribute to the development of disaster prepared society. I am very much happy that we can organize today's workshop with the collaboration of NSET, which has demonstrated well that the seismic retrofitting of school could be used for awareness and capacity building of communities to cope with the future disaster risks through our collaborative project in the past. Our current project, "Reducing vulnerability of school children to earthquakes" has been greatly benefited at its formulation phase from the experience of school programme in Nepal, among others. Most of the components of the current project have been exercised in school safety program in Nepal and hence, there are ample learning opportunities for their adoption and adaptation in other countries.

Ladies and gentleman,

Main objectives of this workshop are, (1) to facilitate discussion between government and professionals, (2) to define the challenges in bringing school safety in national and local policies, and (3) to provide the participants with opportunity for field survey of community based school retrofitting program executed in Nepal several years ago. I am certain that international participants could learn a lot from this workshop, and at the same time, local participants also could learn from the experiences and efforts of your own country Nepal.
I wish you lively, constructive, and practical solution-oriented deliberations and every success with this international workshop.

Thank you very much.

Message

Mangal Siddhi Manandhar
Honarable Minister for Education and Sports, Govenment of Nepal

Mr. Ram Sarobar Dubey, Secretary of the MinistryI am happy to learn that United Nations Centre for Regional Development (UNCRD) and National Society for Earthquake Technology – Nepal (NSET) are jointly organizing the International Workshop on School Earthquake Safety during 1-2 June 2006 in Kathmandu, Nepal, in association with the UN Secretariat for International Strategy for Disaster Reduction (UN ISDR), the National Graduate Institute for Policy Studies (GRIPS), Tokyo, and the Kyoto University. The Nepal Government is involved in this effort through our Department of Education, a centre-level institution under the Ministry of Education that is tasked with the responsibility to ensure disaster-safe and environment-friendy ambience in our schools which is a precondition for achieving effective and sustainable infrastructure for the entire schooling system.

We are saddened by very high proportions of death of school-going children during recent earthquake disasters in developing countries. While damage of a residential building may affect a household, the collapse of a school building can kill hundreds of school children in the matter of a few seconds. That is what happened recently in Pakistan, where entire communities have lost their generation of school-going children. We regard the event as a wake up call!

We are concerned about the high seismic risk in the Asia-Pacific Region where earthquakes have happened in the past and are expected in future. But we are also encouraged to note that people like you have developed knowledge and technologies to combat the high disaster risk, and that several successful good practices have been developed to make communities a safer from earthquakes. It is heartening to note that these technologies have also demonstrated high levels of social, cultural and economic feasibility.

The task now is to upscale the application of such proven technologies into the national and local conditions and institutionalize them into the system of governance. After all, democracy also means ensuring citizens' safety as a key responsibility of the governments, and Nepal government is committed to this principle.

I am happy to lean that representative of Fiji, India, Indonesia, Japan, Nepal and Uzbekistan will be sharing their experiences of making schools safer against disasters in this workshop.

I thank the organizers for selecting Kathmandu as the venue for this meeting. As you know, we are going through difficult times in putting things back to normal and we are challenged by different difficulties. Nonetheless, I can assure you that Nepal will continue to put efforts to ensure safety of school children against hazards, and that they have conducive environment for learning. I know that we can do it with your goodwill, understanding and cooperation.

I wish you success in your deliberations and fruitful discussion. I am eager to know what you collectively decide in this workshop for that will guide us in our future endeavors to make our schools safe in Nepal.

Thank you.

Message

Salvano Briceno
Director, UN Secretariat for International Strategy for Disaster Reduction (UN ISDR)

Dear Participants, Ladies and Gentlemen,

Salvano Briceno, Director of the ISDR secretariat apologies for his absence today due to prior commitments and has asked me to convey the following message on his be half:

I would like to start by thanking the United Nations Centre for Regional Development and Nepal's National Society for Earthquake Technology for inviting me to speak at this international workshop on Keeping Schools Safe from Earthquakes.

The theme of this workshop is at the heart of the ***"Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters"*** , which was adopted by 168 Governments at the World Conference on Disaster Reduction in Japan in January 2005. The Hyogo Framework for Action is a ten-year plan with a set of goals and priority actions of which building schools and other public facilities to withstand natural hazards is a key element to make disaster risk reduction an essential component of development policies, plans and programmes.

Just seven months have passed since the tragic earthquake in Pakistan in which 18,000 children were crushed to death in schools that were unable to withstand the force of the quake. These precious and youthful lives lost amount to nearly 20 percent of the 97,000 deaths caused by disasters in 2005 alone.

Furthermore, in a recent study that commissioned by the ISDR's Task Force Cluster Group on Education, it was estimated that roughly one billion children aged 0-14 live countries with high seismic risk which puts several hundred million children at risk while they are attending schools. And this is only in the event of an earthquake. We must not forget that schools are equally vulnerable to damage or destruction during other natural hazards such as strong winds, tsunamis, landslides and floods. Just this February, more than 200 children attending school were buried alive in Leyte Island in the Philippines. By these numbers a lone, it is clear that we need to do more to ensure that building or retrofitting schools to withstand natural hazards is a top priority for Governments in countries at high risk. While school safety is a major element of the Hyogo Framework for Action, the challenge we all face is to make sure that practical measures and tangible activities are taken so that when the next disaster strikes and the one following, the lives of children around the world are saved.

The good news is that as you here today are demonstrating across the developing and developed world, the knowledge, expertise and resources exist to build hazard resistant buildings.

Examples in Algeria, Afghanistan, Colombia, India, Turkey, and, of course, here in Nepal show that the level of organization, finance, building code enforcement training of builders, mobilization of community support and political commitment in constructing safe schools can offer many lessons learned to other countries at high seismic risk. The experience of the Nepalese Government as well as that ouf NSET is to be commended as a pioneering effort in this regard.

Additionally, there are many resources available developed by a range of stakeholders including international organizations, local NGOs, engineers, masons and contractors that provide low cost, accessible technology and design using a community based approach. Part of the UN/ISDR's mandate is to serve as an information clearing house of disaster risk reduction initiatives. Many existing tools as well as lessons learned are being compiled and made available on our website and these will include the guidelines and best practices of community based investment in school safety.

School safety is one of the key themes of ISDR's World Disaster Reduction Campaign for 2006-20007. As many of you know, the ISDR secretariat takes

the lead in coordinating what are now biennial global campaigns that aim to reduce loss of live and livelihoods as a result of vulnerability to natural hazards.

The 2006-2007 Campaign, entitled "Disaster Risk Reduction Begins at School", has been developed on the premise that children represent hope for the future in all societies. Schools by extension, because of their direct link to yourths are universally regarded as institutions of learning, for instilling cultural values and passing on both traditional and conventional knowledge to younger generations.

Schools also serve as a community's central location for meetings and group activities, in normal times and as make shift hospitals, vaccination centres or places of refuge and shelter in times of disaster. When schools are destroyed, they take away the precious lives of children and teachers and stall access to education in the aftermath of the disaster. Rebuilding these schools can take years and is very costly.

The Campaign's main objectives are to promote the safe construction and retrofitting of school buildings to withstand natural hazards and to promote the integration of disaster risk education in school curricula. I urge you all to contribute your valuable knowledge and expertise to this Campaign, after its launch on 15 June, as it will provide visibility to your work as well as aim to raise awareness, mobilize action and harness existing practices in the field of safer school construction and disaster education.

I conclude by expressing my gratitude for your active engagement in identifying the challenges of and implementing school safety at the local and national level. The ISDR secretariat and many partners remain available and committed to work with you in addressing these challenges. I thank you and I wish you a productive workshop.

Inaugural Speech

Ram Sarobar Dubey
Acting Secretary, Ministry of Education and Sports, Government of Nepal

Nepal faces a multitude of natural Hazards. Due to high degrees of hazards and exposures, and also because of existing vulnerabilities, the disaster risk is very high. Earthquake risk of Nepal is one of the highest in the world.

Earthquake events in the past have evidenced that schools are highly vulnerable to earthquakes and deserve special attention. Despite serious constraints, Nepal Government wants to put effective efforts towards managing and minimizing Earthquake Risk of schools.

a. Nepal is a part of the UN efforts reflected in the Hyogo Framework of Action which calls for the governments to ensure safety of school buildings and promotion of disaster Education

b. Nepal is committed also to the UN Declaration of the Decade for Education for Sustainable Development (ESD 2005-2009) which emphasizes integration of environmental and disaster concerns into knowledge development and transmission paradigm

It is obvious that the government should work in close collaboration with the donor agencies, international institutions and UN agencies, and also with specialized institutions and networks of NGOs and the civil society.

I look upon this event in this context. I am very happy to see that UNCRD and NSET have collectively mobilized efforts together with the Department of Education, Ministry of Education & Sports, Government of Nepal, the UN Secretariat for International Strategy for Disaster reduction (UN ISDR), National Graduate Institute for Policy Studies, Tokyo, Japan, and Kyoto University, Japan for discussing the key issues of School Earthquake Safety programs such as Public Policy, Earthquake Safety of School Buildings, and Disaster Education & Awareness. We do appreciate the contribution of NSET in conceptualization and implementation of School Earthquake Safety Program, which was started way back in 1997. I am happy to say that the initiation was done in close consultation with Ministry of Education. And the cooperation continues, because

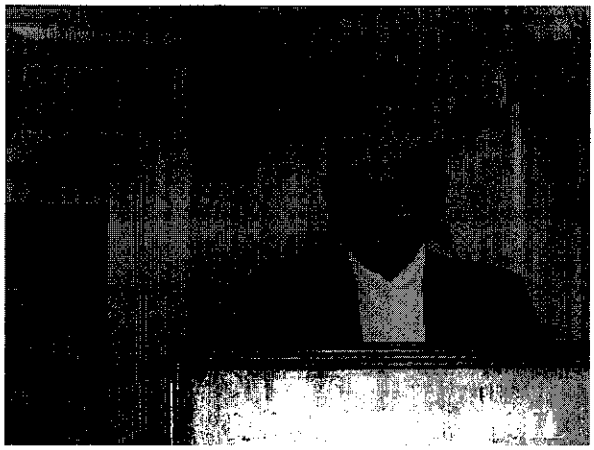


Photo. Ram Sarobar Dubey

the task is immense – we have to cover more than 30 thousand public schools plus several thousand private schools in the country, make their buildings safe against earthquake and other natural hazards, develop disaster preparedness plans and conduct drill periodically. We have to develop appropriate curricula and train our teachers accordingly so that they could impart the necessary knowledge to the students. I do appreciate the continued efforts of NSET in international networking for making schools safer against disasters.

I thank the organizers for selecting Kathmandu as the venue for this meeting. We look at this decision of yours as the recognition of a decade-long work on This perhaps is a recognition of the works on school earthquake recognizes the As you know, we are going through difficult times in putting things back to normal and we are challenged by different difficulties. Nonetheless, I can assure you that Nepal will continue to put efforts to ensure safety of school children against hazards, and that they have conducive environment for learning. I know that we can do it with your goodwill, understanding and cooperation.

I thank you also for allowing me to express my feelings in this gathering of learned people.

Theme Presentation
"Keeping Schools Safe from Earthquakes"

Introduction

Kenji Okazaki
Professor, National Graduate Institute for Policy Studies (GRIPS)
"School earthquake safety and national policy: making the case for safe schools"

Bishnu Pandey
Researcher, United Nations Centre for Regional Development (UNCRD)
"Seismic retrofitting of school buildings

Ravi Shinha
Professor, IIT Bombay, India
"Nepal's efforts towards environment friendly and disaster-safer schools"

Shambhu Prasad Uprety
Deputy Director, Department of Education, Government of Nepal
"Condition Assessment and Seismic Retrofitting of Masonry Buildings"

A.S. Arya
Seismic Advisor, Government of India
"School Earthquake Safety during Post Disaster Reconstruction"

Mr. V. Thiruppugazh
Joint CEO, Gujarat State Disaster Management Authority (GSDMA), India

Introductory Remarks

Kenji Okazaki
Professor, National Graduate Institute for Policy Studied (GRIPS)

Summary

Securing Safety of Buildings

Vulnerable houses or buildings are the major cause of earthquake disaster as we have witnessed in earthquakes, most of the victims are killed by their own houses, and by some important buildings such as schools. Vulnerable houses/buildings magnify a disaster as most tragedies in disasters are attributed to loss of lives and shelters. Further, loss of lives and shelters severely affect social and economic activities and collapsed buildings hinder evacuation, relief and firefighting activities. It is evident that vulnerable school buildings may kill many children at a time.

Securing housing safety is the most important and technically easy, but we need to get rid of vicious cycle for unsafe housing caused by the factors: increase of vulnerable houses, increased victims and no system for incentive for safe construction in recovery as well as during normal time. It is proposed to have system of incentive for safer housing which increase the number of resilient houses and decrease the victims in case of disaster and that also allows support for safer houses during reconstruction.

10 Major Disasters (fatalities) in the last 30 years

Nation	Disaster	Year	Death
China	Earthquake	1976	290,000
Colombia	Volcano	1985	21,000
Armenia	Earthquake	1988	25,000
Iran	Earthquake	1990	35,000
Bangladesh	Cyc/flood	1991	140,000
Venezuela	Flood	1999	30,000
India	Earthquake	2001	20,000
Iran	Earthquake	2003	27,000
Indonesia, others	Eq/tsunami	2004	over 300,000
Pakistan	Earthquake	2005	over 80,000

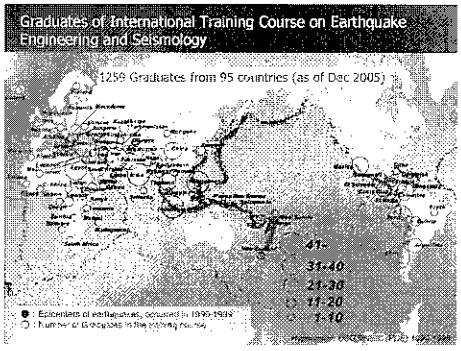


Figure: From Okazaki's presentation

Photo. Kenji Okazaki

Schools and Disaster Management

School earthquake safety projects not only secure the lives of school children but make schools functioned as evacuation centre in case of disasters. More importantly they may facilitate for appropriate technology transfer to communities and help build culture of safer houses. During the Kobe earthquake in 1995, 67 public schools and 40 private schools were severely damaged. Nonetheless, out of 240,000 evacuees, 60% were evacuated at more than 200 schools. It gives the image how important the schools are in case of such disasters. In Japan, 67, 752 (51.8%) schools were found safe and 27, 000 unsafe while rest could be unsafe as they are built before 1981 and yet to be diagnosed.

Disaster Education in Higher Studies in Japan

National Graduate Institute for Policy Studies (GRIPS) joined with BRI and JICA to start master program in earthquake disaster mitigation since 2005. It accepts 20 international students from developing countries every year. This is in an effort to make earthquake disaster education in higher studies. It is our understanding that retrofitting of schools should be the highest priority in earthquake prone countries and disaster education should be incorporated in to curricula and be carried out for community people.

International Workshop on
Keeping Schools Safe from Earthquakes
1-2 June, 2006, Kathmandu

Keeping Schools Safe from Earthquakes

Kenji Okazaki
National Graduate Institute for Policy Studies (GRIPS)
Japan

10 Major Disasters (fatalities) in the last 30 years

Nation	Disaster	Year	Death
China	Earthquake	1976	290,000
Colombia	Volcano	1985	21,000
Armenia	Earthquake	1988	25,000
Iran	Earthquake	1990	35,000
Bangladesh	Cyc/flood	1991	140,000
Venezuela	Flood	1999	30,000
India	Earthquake	2001	20,000
Iran	Earthquake	2003	27,000
Indonesia, others	Eq/tsunami	2004	over 300,000
Pakistan	Earthquake	2005	over 80,000

Vulnerable houses (Adobe)

Gujarat, India (2001)

Pakistan (2005)

Vulnerable houses (Stones)

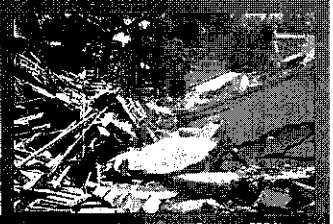
Gujarat, India (2001)

Pakistan (2005)

Vulnerable houses (bricks)

Bam, Iran (2003)

Java, Indonesia (May, 2006)



Courtesy: BBC News

Vulnerable houses (wooden)

Kobe, Japan (1995)

Vulnerable houses/buildings is the major cause of earthquake disaster

In earthquakes, most of the victims are killed by their own houses, and by some important buildings such as schools.

Most tragedies in disasters are attributed to loss of lives and shelters.

Vulnerable houses/buildings magnify a disaster

Loss of lives and shelters severely affect social and economic activities.

Collapsed buildings hinder evacuation, relief and firefighting activities.

Damaged (wooden) houses easily catch fires.

Vulnerable school buildings may kill many children.

Securing housing safety is the most important and technically easy, but ---

Vicious cycle for unsafer houses

- Increase of victims
- Support for recovery locally, nationally, internationally
- Increase of vulnerable houses
- No incentive for safer houses

Securing housing safety is the most important and technically easy, hence ---

Proposed cycle for safer houses

- Decrease of victims and recovery cost
- Support for safer houses locally, nationally, internationally
- Increase of safer houses
- Strong incentive for safer houses

School Project

- Secure safety of school buildings
  - to save lives of children
  - function as evacuation centers in case of disasters
- Disaster education of children, eventually community people
- Technology transfer and training
- Culture for safer houses/buildings

South Asia Earthquake Oct. 2006, Pakistan

Some 400 school children were killed when this high school collapsed in Muzafarrabad. (courtesy ADB)

Workers pull out an injured boy (courtesy Reuter)

Schools destructed by tsunami, Aceh, Indonesia, 2004

2004 Tsunami/earthquake, Indonesia

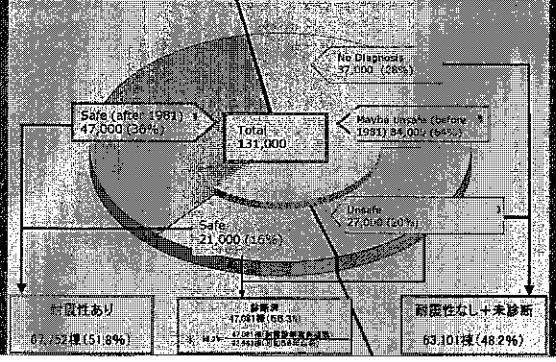
Casualties of students and teachers

- Over 17,000 students were killed
- 150,000 students lost education facilities
- Over 1,800 teachers were killed
- Over 2,100 schools were destroyed

School damage in 1995 Kobe Earthquake

- Damage of school buildings
  - 85% of schools were damaged
  - 67 public schools and 40 private schools were severely damaged
  - (Fortunately, there were no students attending as the earthquake occurred in early morning)
- Out of 240,000 evacuees (as of 24 Jan), 60% were evacuated at more than 200 schools

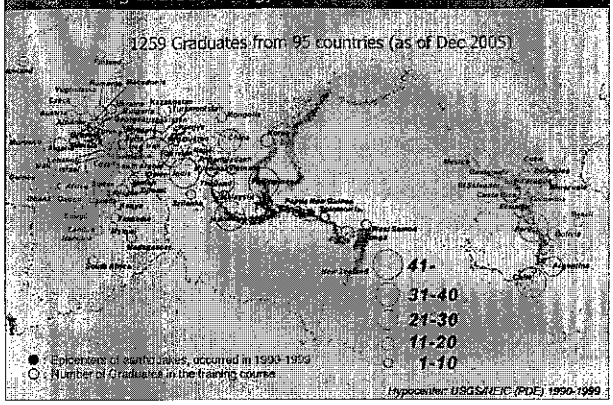
Seismic diagnosis and retrofitting of public school buildings in Japan



Education for Earthquake Disaster Mitigation

- A Master's degree program by GRIPS, BRI, and JICA
- BRI ("Building Research Institute") and JICA have conducted the "International Training Course on Earthquake Engineering and Seismology" since 1962.
- In 2005, the training course has been upgraded as the master's degree program "Earthquake Disaster Mitigation" at GRIPS. (20 students from developing countries)
- From Oct. 2006, the program is expanded to include a new course for "tsunami disaster mitigation" (additional 5 students). It is supported by UNESCO.
- GRIPS is a graduate school and research institute. It aims to be an international center of excellence for the education of future leaders in the policy arena.

Graduates of International Training Course on Earthquake Engineering and Seismology



Schools and disaster management

- School buildings must be safe against any earthquakes. Retrofitting of school buildings should be the highest priority in earthquake prone countries.
- Disaster education should be incorporated into curricula and be carried out for community people.
- "School Projects" are very effective initiatives for community-based earthquake disaster management.

School Eartyquake Safety and National Policy

Bishnu Pandey
Researcher, United Nations Center for Regional Development

Summary

School Earthquake Safety and National Policy

Earthquake-threatened communities need earthquake-resistant schools to protect their children and teachers. Like other infrastructures, school buildings are subject to damage and collapse in earthquakes. An unsafe school in seismic region incurs life loss of hundreds of school children in addition to the potential damage to the property. Recent earthquake in Pakistan shows that unsafe school buildings can cause loss of entire generation from the communities as some villages lost their entire school going children because of collapse of school buildings. It is, however, well known that the knowledge and technologies to make these schools safe exist and there are several case studies where they are implemented successfully.

The point of concern here is that school safety has not been institutionalized and hence not incorporated in national agenda except some very few instances. In most of the cases, the "best practices" remain as "case studies" and never received national level attention. As it is clear that millions of school children at present are at high risk and government should take the responsibility to safe guard the lives of school going children while they are school, it is urged that there should be national policy to deal the situation and requires special attention to implement the school safety program to get rid of the risk to children.

Safer Schools for Children

As most of government expressed the commitment to implement the Millennium Development Goal (MDG) which targets to "*...ensure that, by 2015, children everywhere boys and girls alike, will be able to complete a full course of primary schooling...*" and also they are the party to the Convention of the Rights of Child which asks ... "*ensure to the maximum extent possible the survival and development of child*", it is imperative to those governments to adopt policy for school children's safety from natural hazards including earthquakes. Otherwise, they will increase the number of victims by sending more students to unsafe schools in efforts to achieve MDG goal.

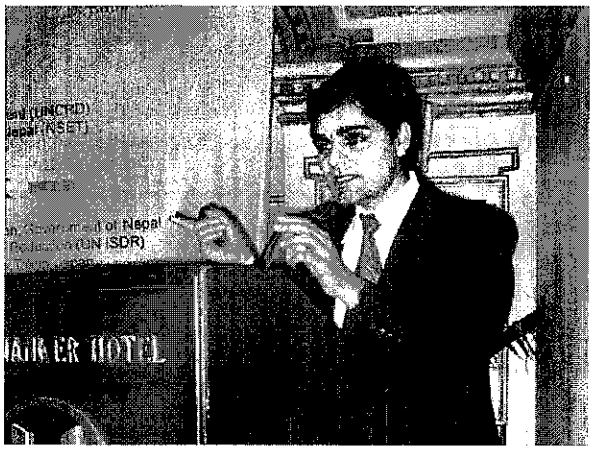


Photo. Kenji Okazaki

It also equally applies to the government's effort to implement "Education for All" program. Every year thousands of school buildings are being constructed in earthquake countries through this program and if those schools are not in compliance to earthquake safety, they will kill school children in earthquake events and governments are to be blamed. Here, it is worthy to quote one child's voice in an international workshop organized by UNESCO in 2003. Ms. Sony Maharjan, age 13, of Nepal claimed "*...it is our right to have a safe school. We don't build our school building ourselves. But if it is very weak and earthquake will destroy it and kill us. Why should we children die from weaknesses which other create? ...*". Like others, safety from disasters is also obviously children's right.

School Safety and Policy Measures
- Case of British Coloumbia

Looking at the urgency and importance of the matter, national governments should take policy measures with special attention. There may be some doubts over allocation of resource (budget) for retrofitting of thousands of vulnerable schools from the ground that budget resource for education should not be diverted to school construction as education sector has already witnessed heavy budget cut in many countries. Obviously, the resource should not be

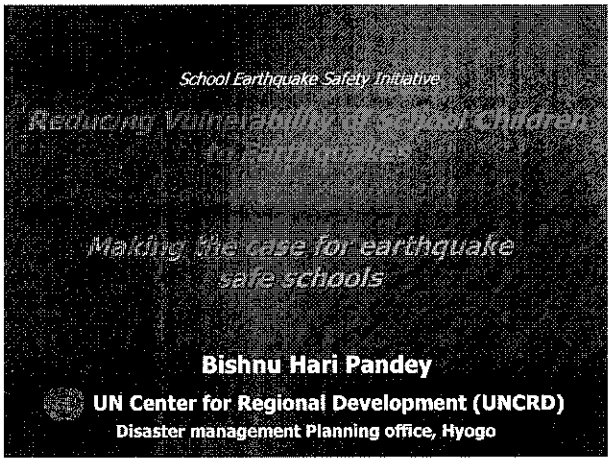
diverted from training, curricula development, teachers' training etc as this is the case of infrastructure protection not the education. School buildings are similar public infrastructure like irrigation canal or telecommunication tower which gets budget from infrastructure development sector.

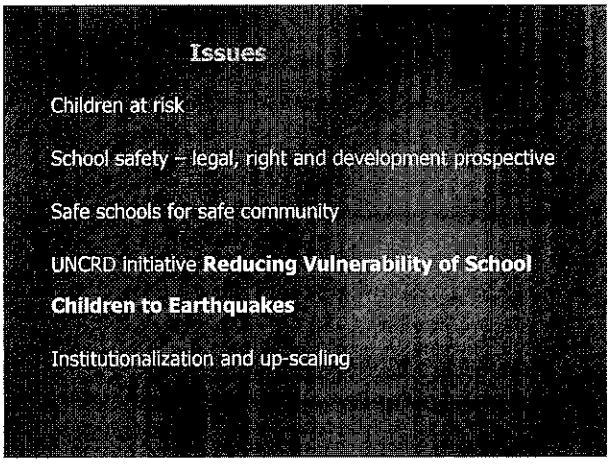
The case of British Colombia where government allocated C$1.5 billion to retrofit all BC schools could be good example to follow. Not only the government's action but the real driving forces of advocacy group lead by "Family for school safety" for this success in Canada is inspiring to all of us to make the case for school safety in our countries.

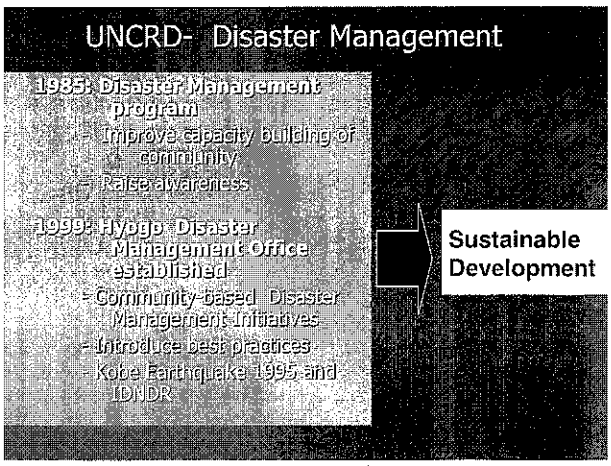
UNCRD's project on School Safety "Reducing Vulnearbility of School Children to Earthquake"

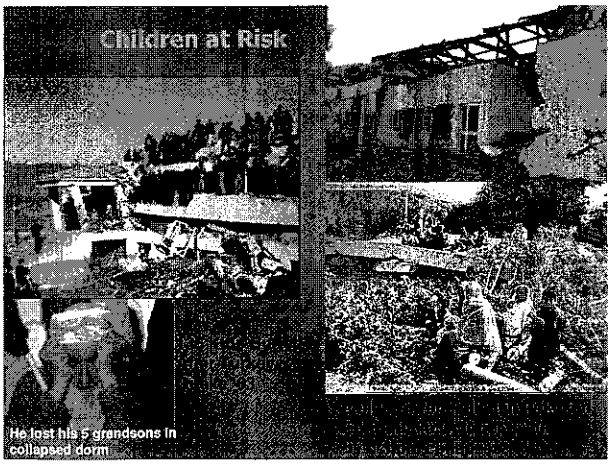
Considering all there concerns, UNCRD has started regional project on school safety in Asia pacific entitled "Reducing vulnerability of school children to earthquake". It focuses on developing and transferring earthquake-resistant technology to school buildings and promoting education related to earthquake disasters which aims to demonstrate countries how school safety could be achieved to in line with Hyogo frameworks for Action.

The fact that the process of making safer schools can be used as an entry points to the communities at risk has been conceived in the project and it is designed to facilitate implementation of a training and capacity -building program for earthquake disaster mitigation technology besides its prime objective of ensuring the safety of school children against future earthquakes. It is achieved by demonstrating how schools can be used as community centres for earthquake disaster prevention and mitigation. This includes physical retrofitting of some selected schools in communities, training of the local communities and technicians, and dissemination of technical materials on earthquake disasters. Locally applicable and affordable earthquake-safer construction technology is transferred to these communities.









Safety of Children- human Security Concept

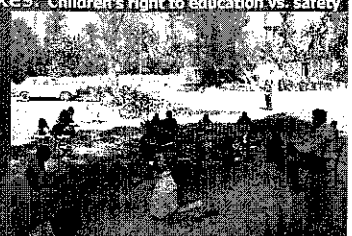
Children are the most vulnerable to disasters

Totally collapsed high school building that claimed lives of more than 50 students in Oct 8 EQ, Muzaffarbad, Pakistan

Outskirt of Muzaffarbad- this community of about 50 households lost their 60% school age students because of collapse of school building

(Information source: personal communication with Mr. H Herrmann, then UNDP officer in Muzaffarbad)

Children and Earthquakes: Children's right to education vs. safety



School children in Bam taking class in hot summer as they lost their schools (after 8 months of Bam '03 EQ)

Millennium Development Goal

"ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling"

Convention of the rights of child

"ensure to the maximum extent possible the survival and development of the child."

Children and Earthquakes

I think that it is our right to know about earthquakes because it is known to everybody including our parent, teachers will try to save their own life. At that time they may not take care of us. So, we ourselves need to know what to do during earthquakes.

Also, it is our right to have a safe school we don't build our school building ourselves. But if it is very weak then earthquake will destroy it and kill us. Why should we children die from weakness which other create that is not because of our fault. It is their fault who build houses. So we request all the parents, teachers to build safe school buildings for us.

Excerpt from a Letter by Ms. Sony Maharjan (13), Nepal to UNESCO addressed at UNESCO conference, Mexico, 2003 *(OECD publication: keeping schools safe from earthquakes")*

Education for All and children's safety

- **Education for all – world wide effort (one of MDG)**
- **Thousands of schools are being constructed in earthquake countries**

- We may put millions of children at risk of earthquake by making them go to school

Investment for the school safety

Should the budget come from education sector?

A case from British- Colombia

Intense Policy debate over funding for school safety- public heath/education/ infrastructure development

British Colombia government allocated **C$1.5 billion** from capital budget for seismic upgrading of all BC schools

Schools and Communities

- **Center of social and cultural life**
- **Entry point to intervene communities**

Safety of children not only during their time at schools but while they are out of schools

School retrofitting program brought change in construction practices

Internalize the concept of safety

Change agents

- **New generation with culture of prevention**
- **Convey the message to parents**

Hands-on exercise of students for safe building configuration – testing models in their own shaking board (source : NSET-UNESCO initiative, 2003)

UNCRD Initiative on school safety

School Earthquake Safety Initiative (SESI) 2001- 2004

- Disaster education , school safety prepared ness
- International campaign on school safety
- Support for safe building construction

Japanese student who witnessed Kobe EQ sharing the experience to Nepali students

Supporting governments on earthquake safe reconstruction/ rehabilitation in Gujarat and Kerman

UNCRD's current Program

Reducing Vulnerability of School Children to Earthquakes (2005-2007)

Asia-pacific Region:

To ensure that school children living in seismic regions have earthquake safe schools and that local communities build capacity to cope with earthquake disasters

Reducing Vulnerability of School Children to Earthquakes

Vulnerability Reduction

- Retrofitting of school buildings
- Earthquake technology application at community level

- Training of engineers , technicians, masons
- Contextualized Guideline for earthquake resistant construction

- Public awareness and education
- School earthquake disaster plan
- Training of teaches and students

CONCEPT

Activities planned

1. School Building Retrofit/Seismic Reconstruction
   - Guideline for Eq.-resistant Construction
2. Technician/Mason Training
   - Training manual
3. Earthquake awareness program and Publication (teacher's training and students drill)
   - children's book on how to live with disaster
   - Interactive software on housing assessment and safer construction
4. Dissemination of the safe practices throughout the countries and respective regions
   - National , regional and international workshops

Approach

Emphasis on institutionalization of the program

Take Appropriate-Tech option:

Focus on overall seismic safety of school not only building

Transfer ownership of concepts and programs to community

Work Plan (some mile stones)

Retrofitting of pilot school buildings

National training workshops

Regional workshop on school safety in each country (*Fiji, Indonesia, India and Uzbekistan*)

Interactive seismic adequacy assessment tool for home owners (in 6 UN language)

International workshop

Thank YOU !

Seismic Retrofitting of School Buildings

Ravi Sinha
Professor, Indian Institute of Techonology (IIT) Bombay, India

Summary

Considerable Factors in School Retrofitting

Retrofitting of school buildings has tremendous multiplier effects as it make schools and children safe from earthquakes and builds the culture of mitigation through the dissemination of information to parents through children and community involvement in the process itself.

Strategy for retrofitting needs to be developed considering the local ground realities. The factors like number of students, age and condition of buildings and level of seismic hazard together affect the decision of retrofitting. As the range of performance objective for retrofitting starts from "hazard reduction" to "continuous operation" through "life safety" and "immediate occupancy" with increase in complexity in technology application and increased cost, the objective of retrofitting in developing countries should be at least for life safety. While planning for retrofitting of school buildings, we need to take account of structure typology, availability of technical skill, standard material and the financial resource prior to decide the specific method and extent of retrofitting.

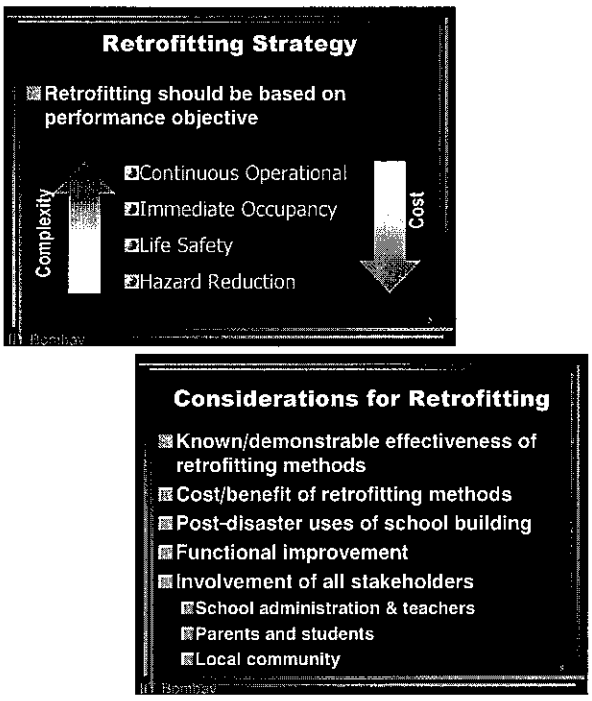


Figure: From Sinha's presentation

Photo. Ravi Sinha

Retrofitting Methodologies

Retrofitting methodologies can be divided into two basic categories: simplified and systematic retrofitting method. While systematic method of retrofitting is required for immediate occupancy and requires detail analysis, simplified method of retrofitting suffice for hazard reduction and life safety objectives. The simplified method can be applied if buildings have simple geometry and low height (<4 stories), have low mass and few stiffness irregularity and if they are not deficient under normal vertical loads. The basic retrofitting measures include making structural members (walls, slab, and column) integral, strengthening of weakest members and links and creating evacuation paths among others. These measures will eliminate the possibility of sudden and catastrophic collapse of school buildings in earthquakes.

During the process of the retrofitting, it is important to involve all stakeholders as this will provide demonstrative effect in the society. The most important stakeholders are teachers, students, parents, school administration and local communities. The retrofitting should also ensure the functional improvement and post-disaster use of schools as evacuation centre and temporary shelter.

Seismic Retrofitting of School Buildings

Prof. Ravi Sinha
Department of Civil Engineering
Indian Institute of Technology Bombay, India

International Workshop on *Keeping Schools Safe from Earthquakes*
Kathmandu, Nepal, June 1-2, 2006

Retrofitting as Strategy

- Retrofitting of school buildings has tremendous multiplier effect
  - Safer schools/children
  - Community involvement
  - Dissemination of information to parents
  - Builds a culture of mitigation and preparedness
- Safer school buildings lead to more secure and better prepared society

IIT Bombay

Characteristics of School Buildings

- Based on number of students
- Based on type of buildings
- Based on age or condition of buildings

IIT Bombay

Retrofitting Strategy

- Strategy for retrofitting needs to be developed for Nepal considering the local ground realities
- Retrofitting strategy should consider a combination of factors
  - Age of school building
  - Condition of school building
  - Number of students
  - Seismic hazard

IIT Bombay

Retrofitting Strategy

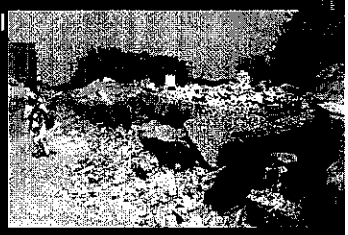
- Retrofitting should be based on performance objective
  - Continuous Operational
  - Immediate Occupancy
  - Life Safety
  - Hazard Reduction

Complexity ↑ Cost ↓

IIT Bombay

Retrofitting Strategy

- For Nepal school buildings, strategy should focus on Hazard Reduction and Life Safety



IIT Bombay

Retrofitting Strategy

- Retrofitting strategy should consider type of structure, availability of technical skills & materials, and cost

IIT Bombay

Considerations for Retrofitting

- Known/demonstrable effectiveness of retrofitting methods
- Cost/benefit of retrofitting methods
- Post-disaster uses of school building
- Functional improvement
- Involvement of all stakeholders
  - School administration & teachers
  - Parents and students
  - Local community

IIT Bombay

Retrofitting Methodology

- Retrofitting methodologies can be divided into two categories
  - Simplified
  - Systematic
- Simplified methodologies are useful for Hazard Reduction and Life Safety performance objectives
- Simplified methodologies may be adequate for most school buildings

IIT Bombay

Simplified Retrofitting Methodology

- Simplified methodologies can be used under following conditions
  - Building should have simple geometry
  - Building should be low height (< 4 stories)
  - Building should have low mass and stiffness irregularity
  - Structure should not be very deficient under "normal" vertical loads

IIT Bombay

Simplified Retrofitting Methodology

- Basic features of simplified retrofitting
  - Reduce falling hazards
  - Make structural members (walls, slabs, columns, etc.) act integrally
  - Strengthen weakest members and weak links
  - Eliminate possibility of sudden and catastrophic collapse
  - Create evacuation paths

IIT Bombay

Summary

- School retrofitting program should be given very high priority
- Retrofitting strategy should consider both safety as well as intended uses after a disaster
- LS or HR performance objective may be adequate
- Simplified methodologies are generally adequate
- Involve all stakeholders during implementation

IIT Bombay

Final Words ...

IIT Bombay

Case Study Presentation
"Assessing the Ongoing Initiatives"

"Need and Prospect of Incorporating Disaster Education into School Curricula"

Koichi Shiwaku
Kyoto University, Japan

"CBDM through School Safety"

Mahesh Nakarmi
Project Manager, National Society for Earthquake Technology-Nepal (NSET-Nepal)

"Saving our future: Assessing the ongoing initiatives on school safety in Fiji"

Joeli Rokovada
Director, National Disaster Management Office (NDMO), Fiji

"School earthquake vulnerability reduction in Indonesia"

Krishna Pribadi
Associate Professor, Institute of Technology Bangdung (ITB), Indonesia

"School Safety Initiatives in India"

Manu Gupta
Co-Director, SEEDS, India

"Earthquake Safety of School Children in Uzbekistan"

Samil Khakimov
Head of Design Department, UzLITTI, Uzbekistan
Khusan Tursonov
Program Coordinator, HAYOT, Uzbekistan

Need and Prospect of Incorporating Disaster Education into School Curricula

Koichi Shiwaku
Kyoto University, Japan

Summary

Goal of the Disaster Education

Goal of the disaster education in schools should be to make students take preparedness and mitigation action for disaster reduction while they are in school age. In a long run, its aim should be to build culture of prevention while they get matured over time and become adult citizens. Continuing education on disaster is a must to achieve this goal.

Cases in Nepal and Japan

Recent survey carried out in Nepal and Japan presents some insight into approach, methods and results of disaster education employed under different circumstances. In Nepal, school education seems more effective in building risk perception while it is community that makes people take mitigation and preparedness action against disasters. School Earthquake Safety Program (SESP) is also found provoking for such action. A survey in a surrounding community of Maiko High School, Kobe, which started formal disaster education some years ago shows that there is tremendous increase of talking about disaster management in individual family after the course began in school. It clearly indicates that what we teach in schools trickle down to community people through school children.

Disaster Mitigation Course in Maiko High School

The environment and disaster mitigation course in Maiko High School has objective of letting students have attitude to think about linkage between natural and social environment through learning process making use of human-nature interfaces including case studies like Kobe earthquake. The underlying philosophy of the disaster course in Maiko School is creating a learning environment where students think about importance of the life and attitude as human beings and thus raising ability of students, who are future citizens of society, against disasters.

The teaching courses can be broadly divided into two category- natural environment including subjects on hazards, natural phenomena, climate change etc and social environment that includes topics on government system, vulnerability of people, built environment, mutual cooperation. Understanding of interaction between these two categories provides concept of disaster risk reduction. The teaching method employs interactive discussion and tools for self realization through establishing problems, discussions among students in groups, presentations and evaluation of the conclusions.

"Disaster Learning" or "Disaster Education"

We observed that education in Maiko School emphasizes more on mitigation and preparedness where as regular schools focus mainly on response, evacuation, relief in concern to disaster management. Maiko school course deals with overall the social environment in relation to disaster management. The uniqueness is in method of education as Maiko School asks students to think by themselves through

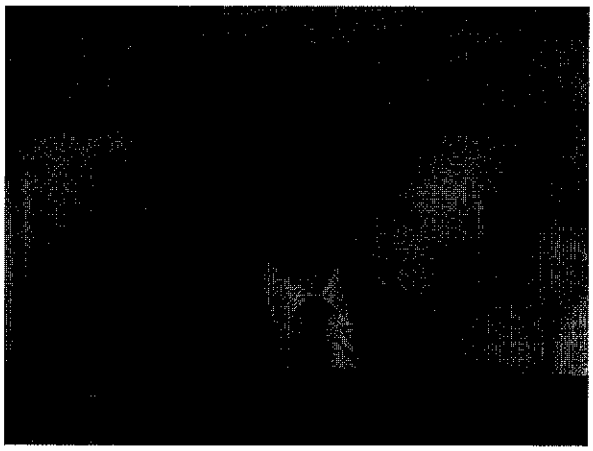


Photo. Koichi Shiwaku

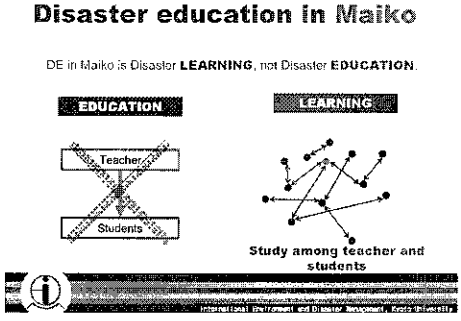
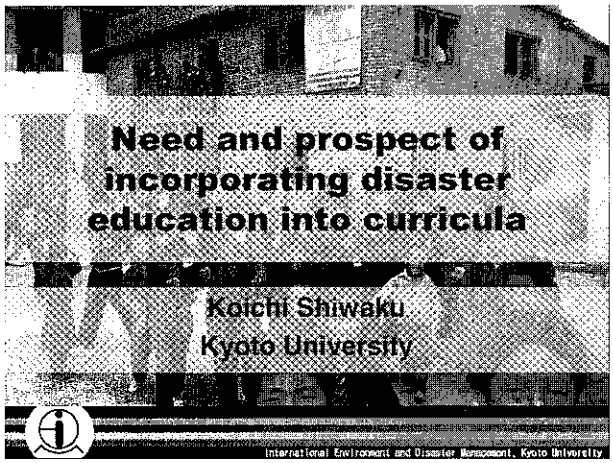


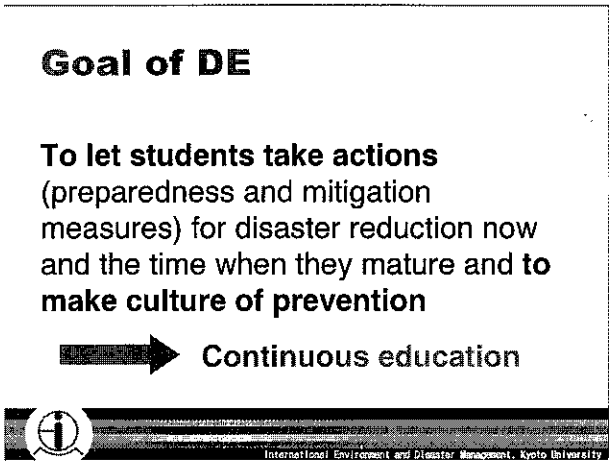
Figure: From Shiwaku's Presentation

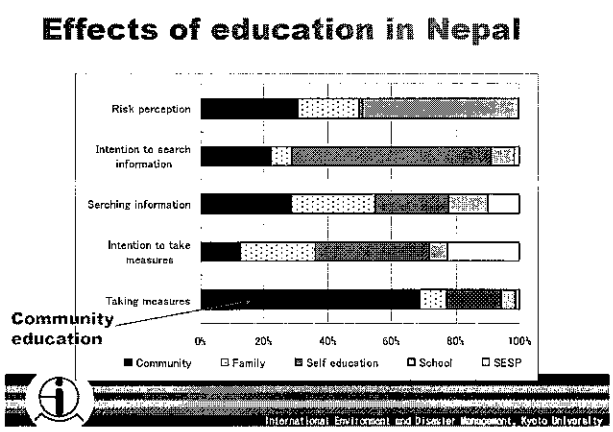
interaction among students and with teachers. We find teachers give lectures to students in other schools. In this note we can say the education in Maiko School is "Disaster Learning" not "Disaster Education". The disaster management is in-built as all subjects including language, social studies, science, English, information deal with disasters.

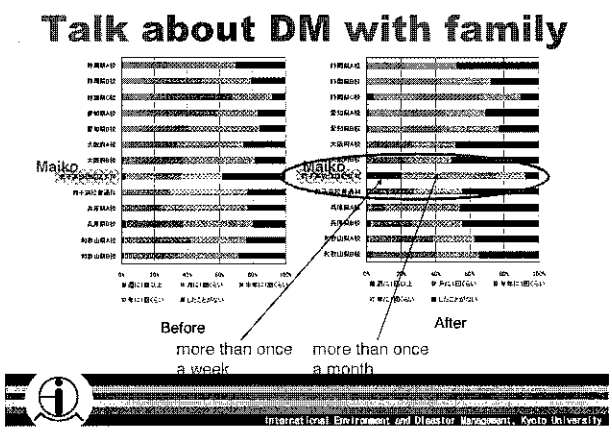
"Understandting" makes students take "Action"

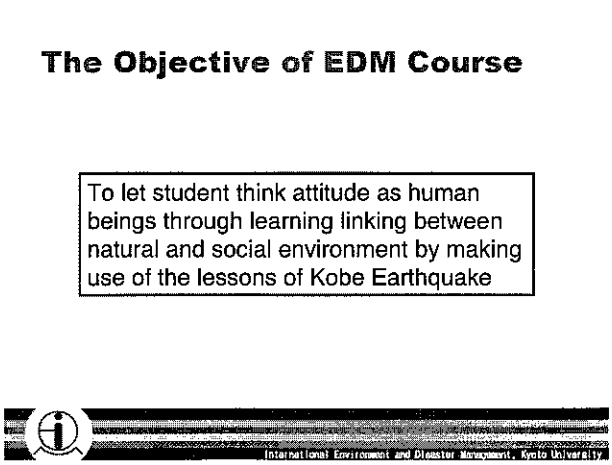
Looking at the cases mentioned earlier, it is important to distinguish between "know" and "understand" in relation to the disaster education. The usual education process where teachers teach and students know what they teach does not lead to "action" which is important in this case. Rather, students should "understand" by learning that makes them take "action" for disaster reduction.







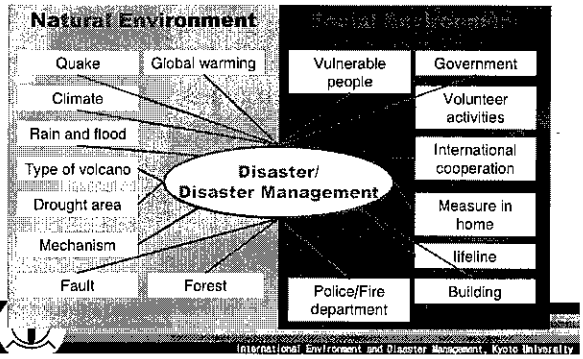




Education philosophy

- **Based on the lessons of Kobe Earthquake, to let students think *importance of the life* and attitude as human beings, to raise student's ability against disasters, and to raise people who can *contribute to society***
- **To let students understand the *environment (natural & social)* through learning linking between disasters and society**
- **Think Globally, Act Locally**

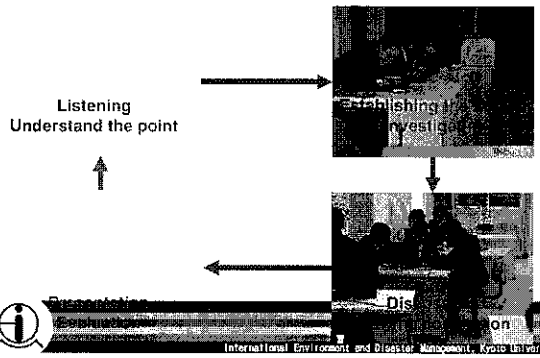
Concept of education in Maiko



Ability required by EDM Course

- **Fundamental knowledge** (math, science, history, English, ・・・・)
- **Comprehensive ability** (find problems, solve problems, show ideas or opinions by themselves, ・・・・)
- **Interest**

Activity in class

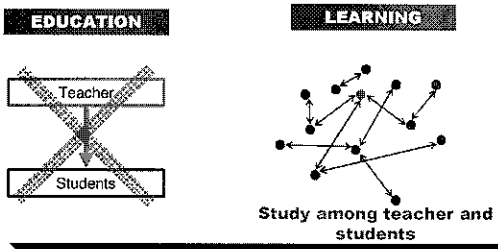


Comparison between Maiko and Other schools

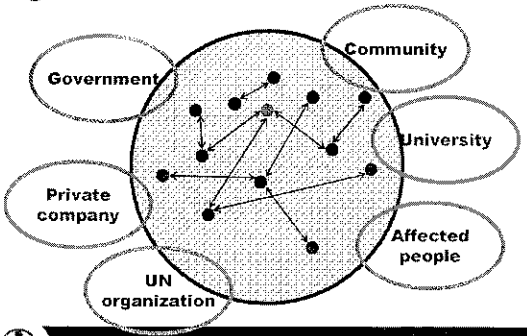
	Maiko	Other School
DM Cycle	Mitigation, Preparedness	Response
Topic	Natural environment **Social environment**	Evacuation Relief
Activity	Students think by themselves	Teacher teach students

Disaster education in Maiko

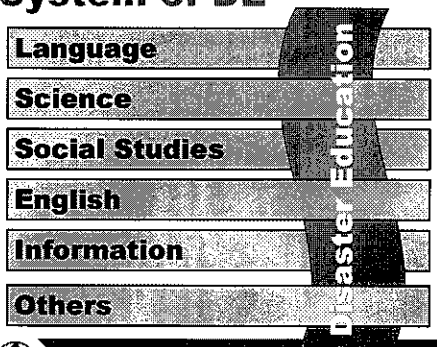
DE in Maiko is Disaster **LEARNING**, not Disaster **EDUCATION**.



System in EDM Course



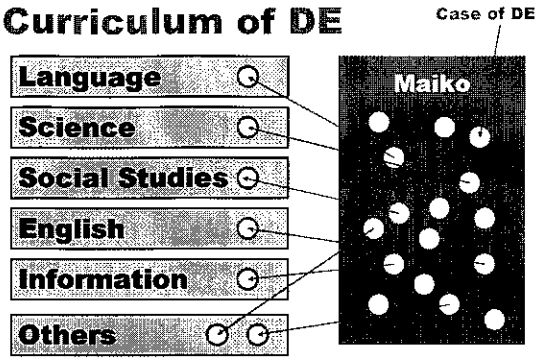
System of DE



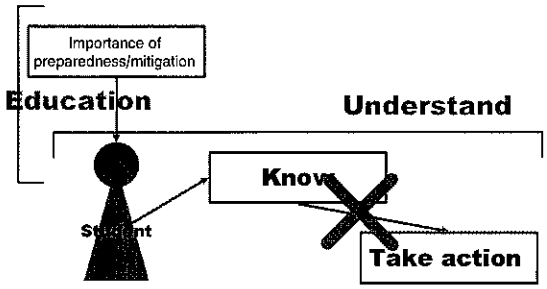
Objectives of DE

1. To know how to save life
2. To teach education for human beings
3. To know the society
4. To know natural environment
5. To know how to reduce or mitigate the damage of disasters in various level
6. To know importance of life

Curriculum of DE



"Know" and "Understand"



CBDM through School Safety

Mahesh Nakarmi
Project Manager, National Society for Earthquake Technology-Nepal (NSET-Neppal), Nepal

Summary

School Earthquake Safety Program (SESP) in Nepal

Reducing public schools' earthquake vulnerability was one of the objectives of KVERMP that was implemented since 1997 through 2001. Accordingly, the School Earthquake Safety Program (SESP) was initiated that targeted to assess the structural vulnerability of the prevalent school building types, and to implement a retrofit of one school building as a pilot project. The pilot project was completed in 1999 very successfully. This led to increased interest from the public schools to participate in the program, and with increasing national and international support for the school program, NSET continues assisting communities in Kathmandu Valley and outside in seismic retrofitting of their buildings.

School Earthquake Safety Program is one of the priority initiatives included in the Kathmandu Valley Earthquake Risk Management Action Plan prepared under KVERMP. In its effort towards the Action Plan implementation, NSET is continuing SESP in Kathmandu and outside with collaboration with various organizations including government, bilateral agencies, INGOs, NGOs and local communities.

There has been a strong participation by the national government agencies, district and municipal governments, and more importantly, by the local communities. Similarly, there has been a very high level of cooperation and interest from the schools and school officials, as well as business sector in this program.

Seismic Safety of School Buildings in Nepal

Public schools in Nepal, both their buildings and their occupants, face extreme risk from earthquakes. Considering the high vulnerability of school system, KVERMP focused on schools. The other reasons to for schools are the obvious benefits that safe school brings to community such as building culture of prevention in society, providing temporary shelters in emergencies etc. At first, the SESP included a vulnerability assessment of Kathmandu Valley's public schools as an example of how to conduct earthquake risk mitigation projects in Nepal. The assessment

Photo. Mahesh Nakarmi

showed that more than 60% of the buildings are built using traditional material that behaves very poorly in earthquakes. It was found that majority of were built without considering seismic forces at all. Looking at the scale of problem, NSET subscribed the concept of incremental seismic safety and opted to explore further the feasibility of structural intervention for reducing existing vulnerability of the school buildings.

Content and Achievement of SESP

NSET adopted participatory approach for retrofitting of schools. Governments, teachers, students, communities and business sector are all involved in the program though advisory committees, school safety committees, earthquake safety club etc. Because of the involvement of a very wide section of communities and institutions, SESP has proven to be a strong disaster awareness raising activity.

The SESP consists of three closely inter-knit sub-components, namely, (1) Training of masons, (2) Training of teachers, parents and teachers on earthquake preparedness and preparedness planning, and (3) seismic retrofit or earthquake-resistant reconstruction of public school buildings.

In course of running the program, SESP has undergone several changes and additions. More new players are becoming partners in implementing earthquake-resistance into the construction of public school buildings in Nepal. The School Earthquake Safety Program has so far accomplished seismic

retrofitting of school buildings of 20 schools in and outside Kathmandu valley and associated trainings and other activities in surrounding communities.

The whole execution of project is designed as a tool of developing skilled manpower in earthquake resistant construction in local level through mason trainings. The training courses follow hierarchical procedure starting from problem identification to end at testing of methods of learned. Based on the experiences gained from the mason training, a curriculum/guideline for Mason Training has been prepared.

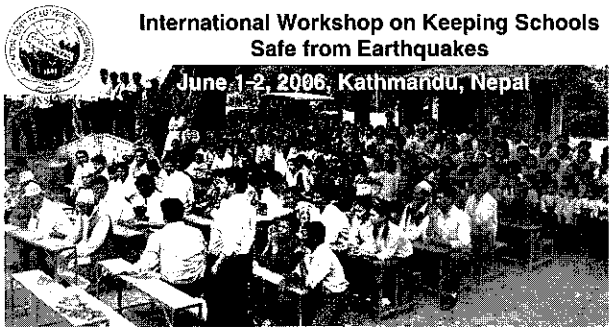
Apart from mason trainings, trainings to teachers and parents on earthquake preparedness planning and establishment of evacuation and fire drills in the schools are being carried which resulted into development of an Earthquake Kit. Several meetings were held with the local communities and the school officials NSET will continue its efforts in implementing such training program in the schools. All this has resulted in greater awareness in the communities on earthquake disaster risk and risk reduction.

In all the communities where SESP has conducted, the house owners of respective locality have been replicating the construction methods employed in school building to construct their private houses without intervention from NSET-Nepal. Except some minor features, newly constructed houses adopt all basic earthquake resistant construction technology like bands, wall stitching, vertical tensile reds etc. It shows higher level of perception on what masons are trained. "Trust building" is a major aspect of SESP process where all stakeholders are involved in the project activities right from its planning phase.

Lessons learned from SESP

The major lessons learned from the SESP can be summarized:

- Retrofitting a School is an important awareness raising opportunity
- "What is accepted by the Community" is more important than "What is necessary?"
- Community-based Approach is Key to Risk Management Efforts
- Transparency Pays
- Training Program for Mason is essential for a Successful School Earthquake Safety



Community Based Disaster Management (CBDM)through School Safety

Mahesh Nakarmi, Amod Dixit, Ram Chandra Kandel

HISTORY & BACKGROUND of SESP

Concept Developed
- During KVERMP Implementation (September 1997 – February 2001)
- One of the component of KVERMP
- Continued till date

Objectives
- Reduce the public schools' earthquake vulnerability;
- Raise awareness about Kathmandu Valley's earthquake risk; and
- Capacity Building, Strengthening local Capability

Implementation
- Strong participation of Ministry of Education, District Development Committees, Schools and other stakeholders thru Advisory Committees, workshops, other activities

SESP CONCEPT DEVELOPMENT:

WHY PUBLIC SCHOOLS?

- **Inherent Vulnerability of Nepalese Public Schools**
- **Damage due to past Earthquakes**
  - 6000 school buildings
  - 300,000 children could not attend schools for several months
- **Public Schools are**
  - Centers of social and cultural life in normal times, and
  - During emergencies (shelters, temp hospitals, relief centers as they are evenly distributed in a community)
  - Children are vulnerable
  - Higher Psychological impact of school loss, functioning schools give sense of normality

SESP CONCEPT DEVELOPMENT:

WHY PUBLIC SCHOOLS?

Schools are also particularly tractable for earthquake safety programs
- Schools structures are typically very simple and relatively small
- Inexpensive to build new schools in an earthquake resistant fashion
- Affordable to retrofit existing schools.

By raising awareness in schools
- the entire community is reached because the lessons trickle down to parents, relatives, and friends

SESP CONCEPT DEVELOPMENT:
Vulnerability Assessment of Public School Buildings

Vulnerability Assessment of Kathmandu Valley's public schools

An example of how to conduct earthquake risk mitigation projects in Nepal.

The purpose of this assessment was not to identify individual schools as vulnerable, but to quantify the risk faced by the entire system

Assessment Methodology was innovative

- School Headmasters Seminars
- Survey by School Head Masters - 65% schools covered

Alarming Findings of SESP Survey

More than 60% buildings are built using traditional materials

- behave very poorly during earthquakes.

Less than 40% of the buildings use modern materials

Modern materials are strong, but modern schools using modern materials are not necessarily safer.

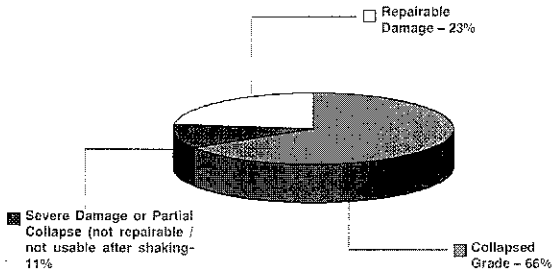
- Built by traditional artisans without any inputs from engineer
- Are typically taller, have larger rooms and larger windows and doors than buildings built with traditional materials.
- These features make many modern buildings as dangerous as the traditional ones

Majority of buildings were built without considering seismic forces at all

- Only 3 buildings were constructed meeting the stipulations of the Nepal National Building Code (draft).
- An additional 4 to 5 percent buildings had some seismic resistant design features

Lack of proper maintenance

Alarming Findings of SESP Survey:
Vulnerability (for intensity IX MSK shaking)



School Building Characteristics

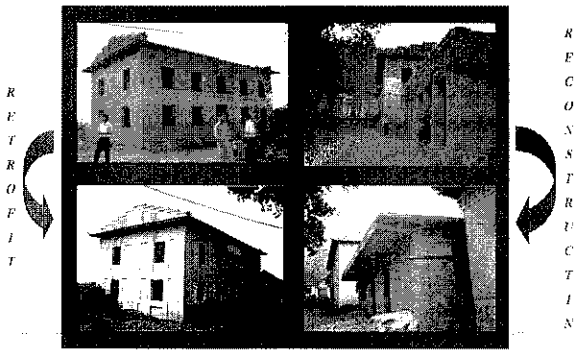
Public school buildings of Kathmandu Valley are:

- Non-engineered, constructed using informal production mechanisms
- Limited Budget : Low-strength Load Bearing Masonry; Poor Materials and Workmanship
- Most are elongated (rectangular) in plan
- Highly vulnerable to earthquakes.
- Public Schools in Nepal face extreme risk

Major Problems

- Weak construction materials
- Heavy wall and roofs
- Poor quality control and construction process
- Untied gable wall
- Lack of integrity between different structural components/elements.

The SES Program



Approach

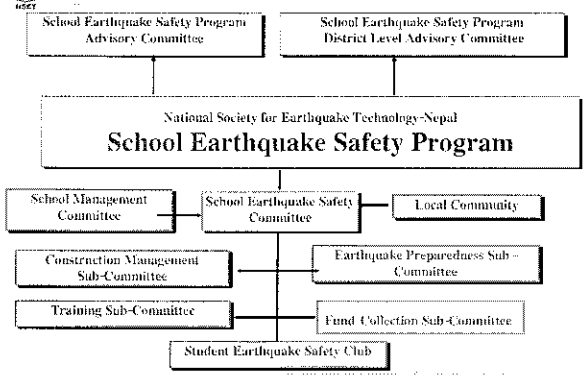
To provide oversight to the program, two standing SESP Advisory Committees at the central and district levels were established

- Committees meet at least once a year
- NSET reports the progress to these committees and submits annual work plans for their endorsement
- Advisory committees has helped widen the outreach of the program and its ownership.

NSET encourages the local community to establish a School Earthquake Safety Committee (SESC) at each SESP site

- The Chairperson of the School Management Committee heads SSC
- Several sub-committees

Management Structure of SESP



SESP Committee Meetings

Approach

- **Involvement of a very wide section of communities and institutions**
  - **Strong awareness raising activity.**
- **A social survey at the start and end of the construction program**
  - **To measure the impact**
  - **A baseline survey with 100 randomly selected respondents in each school community**
  - **A repeat of the survey after the completion of the construction program**

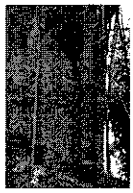
Components

- **Selection of Target Schools - criteria**
  - **Level of commitments of community participation**
  - **Visibility of the school (replicability potential)**
  - **Availability of temporary class run options**
  - **Absence of dispute on land and building ownership**
  - **Availability of local masons in the vicinity**
- **Pre-implementation Management Activities**
  - **Signing MOU between NSET and the School management committee under approval of School Advisory Committee**
- **Technical Assistance during Construction**
  - **NSET carries out survey, design and construction supervision.**
  - **A trained mason is posted at each construction site at NSET's cost.**
  - **NSET engineers conduct classroom training in the evenings**
    - attended not only by the masons, but also by the parents and other members of the community.

Components

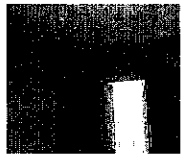
- **Collaboration with other partners**
  - **Working partner – Room to Read (RTR), SNV, Give 2 Asia, Global Fund for Children, Hanuman Onlus**
  - **Other NGOs and INGOs**
- **Collaboration with government**
  - **Working closely with the Department of Education for cooperation in integrating earthquake safety into the School project activities**

Elements of Retrofitting



Corner stitching of brick wall

Splint, bandage, and strengthening around window openings



Horizontal Band at inside

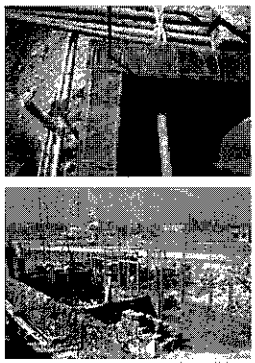
Corner splint

Elements of Retrofitting

Bracing to increase lateral strength of wall

Jacketing of a column

Project in progress



Construction

Interaction with Community

Discussion and Observation of the work by Local Community during Retrofit

Community Meeting

Community Meeting

Training on Site

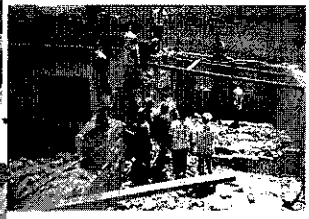

Training Program during Reconstruction

Transfer of Knowledge Practically



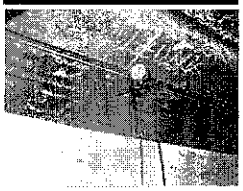
Training Program during Retrofit

Community Participation

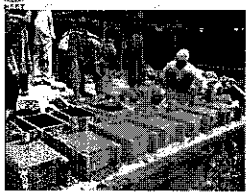
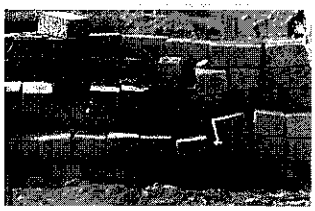

Technology for Problem Soultion





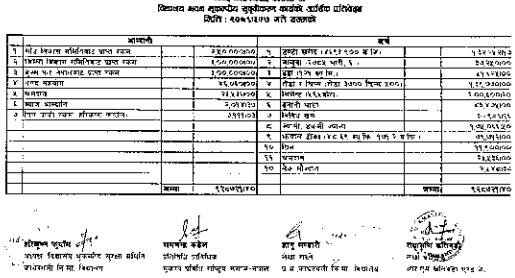
Site Specific Problems and Solution during Retrofit

Appropriate Technology

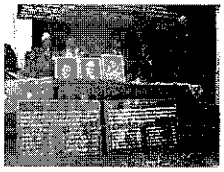
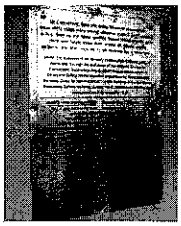
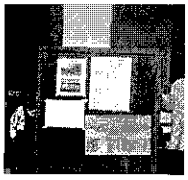

Development of Appropriate material

Transparency



Transparency

Completion Ceremony on the Occasion of Earthquake Safety Day

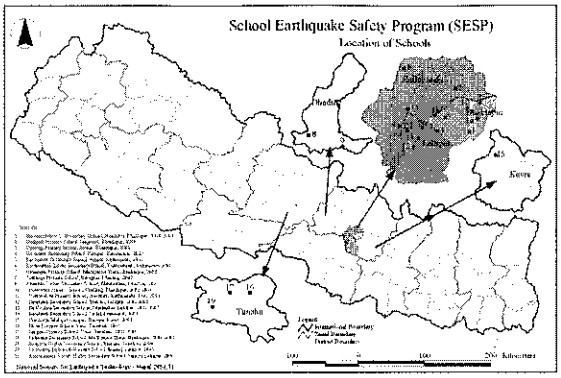




Acknowledgement of the Contributions

Achievements

Affordability of Seismic Improvement of School Buildings Established

- **So far seismic retrofitting of 4 brick masonry buildings**
- **Reconstruction of 18 school buildings inside and outside Kathmandu to the standards of Nepal National Building Code**
- **The experience gained, consolidated in the form of a Hand Book for Seismic – Resistant Construction and Retrofitting of School Buildings in Nepal**



Achievements

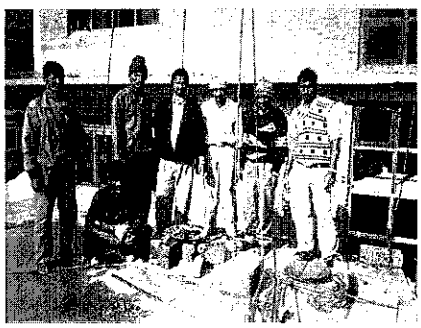
Mason Training

- On-the-job trainings separate training classes in the evening
- The training courses - starting from problem identification to end at testing of methods of learned
- Several tests conducted to support the knowledge
- About 25 masons have been trained – out of which 4 are trained as trainer masons
- Based on the experiences gained from the mason training, a curriculum/guideline for Mason Training has been prepared

Mason Training

Training Program during Retrofit

Exchange of Masons



NSET, Nepal – SEEDS, India Mason Exchange Program

Achievements

Awareness Raising, Training of Teachers, Parents, and Children

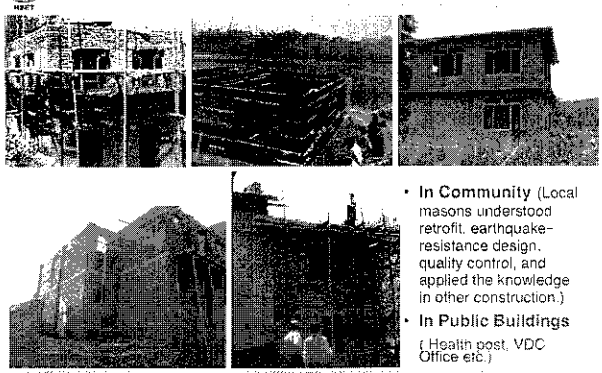
- Training for teachers, children and the parents on earthquake preparedness planning and establishment of evacuation and fire drills in the schools.
- Greater awareness in the communities on earthquake disaster risk and risk reduction.
- New constructions in the settlements surrounding the schools are incorporating seismic-resistant elements, mostly by consulting the SESP masons.

Achievements

Replication

- The house owners of each SESP locality have been replicating the construction methods employed in school building to construct their private houses without intervention from NSET-Nepal
- Newly constructed houses adopt all basic earthquake resistant construction technology like bands, wall stitching, vertical tensile rods etc
- Shows higher level of perception on what masons are trained
- The process of replication would multiply in future to set a new technological culture in construction
- The retrofitting project of school has much higher social value compared to other risk reduction programs
- Translate technology in real ground in root level

Replication



- In Community (Local masons understood retrofit, earthquake-resistance design, quality control, and applied the knowledge in other construction.)
- In Public Buildings (Health post, VDC Office etc.)

Replication of technology in new residential and Public Buildings

Achievements

Kathmandu-Kobe Exchange Program

- Collaborative Exchange Program on Earthquake Safety
- Logical continuation of SESP in Bal Bikas Secondary School, Alapot, Kathmandu
- Greatly influenced by the performance of the local community, teachers and students
- Facilitated by NSET and UNCRD (Disaster Management Planning Hyogo Office)
- Learning experiences and sharing knowledge in disaster mitigation
- To raise awareness for disaster preparedness among students, teachers, and other members of the community
- Consists of:
  - Exchange of Culture Box
  - Retrofitting of School Buildings
  - Disaster Education Program
  - Student Exchange Program

Kathmandu-Kobe Exchange Program

Achievements

Trust Building

All institutions were involved in the project activities right from its planning phase.

The Project subsequently provided regular information

- Flow of information and "keeping everybody informed" helped NSET to build up and sustain the trust

The involvement of schools in the SESP process right from the headmasters' seminar also created an environment of trust

The schools that were not included in the process were invited regularly in the SESP events.

Creation of the advisory committee and its meeting provided the transparency that helped build trust.

- Several meetings with the parents and the school management committee.
- Meetings helped consolidate mutual trust, helped explore additional potentials for cooperation, and solve outstanding issues.

Achievements

Trust Building

Flow of information and "keeping everybody informed" helped NSET to build up and sustain the trust

The involvement of schools in the SESP process right from the headmasters' seminar also created an environment of trust

Creation of the advisory committee and its meeting provided the transparency that helped build trust.

Community Meetings helped consolidate mutual trust, helped explore additional potentials for cooperation, and solve outstanding issues.

Achievements

Affordability of Seismic Improvement of School Buildings Established

- The experience gained, consolidated in the form of a Hand Book for Seismic – Resistant Construction and Retrofitting of School Buildings in Nepal

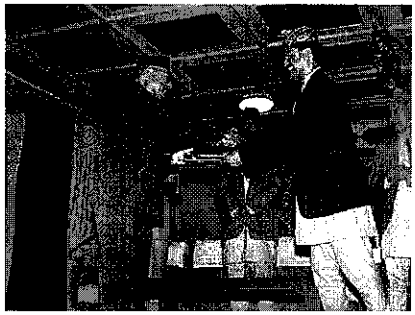
Mason Training

- On-the-job trainings and separate training classes in the evening,
- The training courses - starting from problem identification to end at testing of methods learned

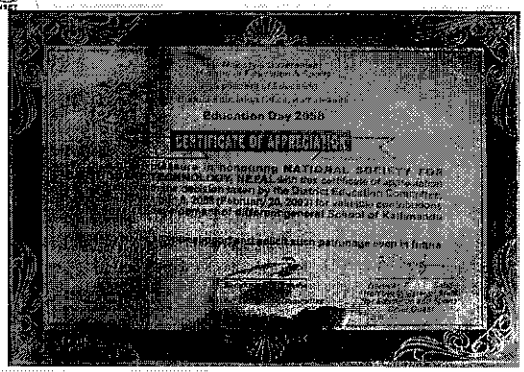
Several tests conducted to support the knowledge

now basis for reconstruction training in Pakistan.

Recognition from DDC-Kathmandu



Appreciation



Evaluation of Achievements

- Focus on School Earthquake Safety drew criticism
- Initial Skepticism was Short-lived

Retrofitting a School is an important awareness raising opportunity

"What is accepted by the Community" is more important than "What is necessary?"

Community-based Approach is Key to Risk Management Efforts

Transparency Pays

Training Program for Mason is essential for a Successful School Earthquake Safety

Most Important Lesson of SESP

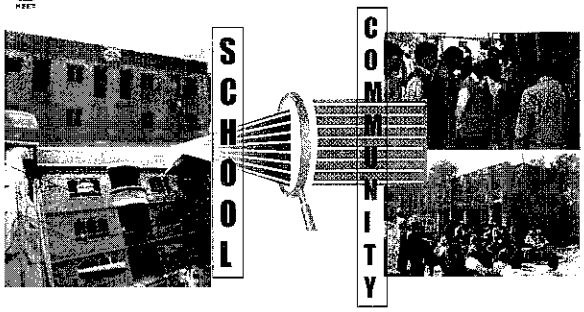
Strengthening the school was important and attractive

But more attractive outcome was

- Retrofitting the school, and
- TRAINING THE MASONS, and
- RAISING AWARENESS OF VILLAGERS, and
- TEACHING THE CHILDREN AND TEACHERS what to do during and before an earthquake.

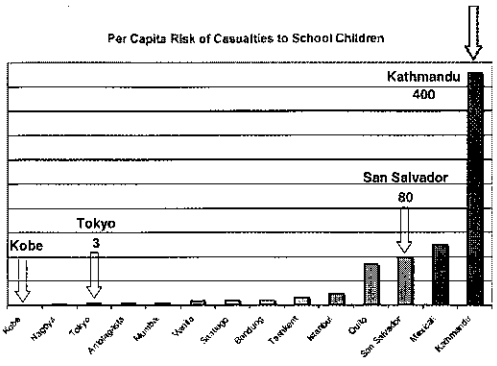
All extras come for a relative small increase in the cost of retrofitting

SCHOOL vs. COMMUNITY



SCHOOL is gateway to COMMUNITY

Per Capita Risk of School Casualties

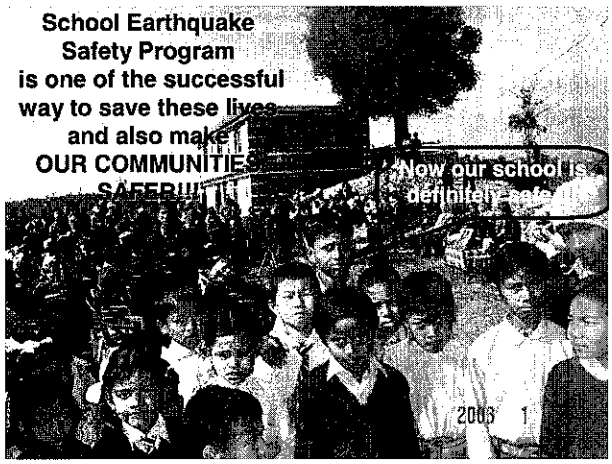


Source: GESI

Do we want to see our schools like this?

Definitely NOT !!!

School Earthquake Safety Program is one of the successful way to save these lives and also make OUR COMMUNITIES SAFER!!!



Thank You!!!

Saving our future: Assessing the ongoing initiatives on school safety in Fiji

Joeli Rokovada
Director, National Disaster Management Office (NDMO), Fiji

Summary

Natural Disasters and Fiji

Fiji is a small island country located in south pacific. It has total land area of 18,272 sq km and population of 838,088 as of 2004. Floods, Tropical cyclone, earthquake, tsunami are the main hazards that have been affecting Fiji. Situated in the Pacific "Rim of Fire", Fiji has frequent small earthquakes. An earthquake in 1953 off Suva with magnitude 6.75 caused considerable destruction of infrastructures and lives. A similar magnitude earthquake striking Suva today would result in greater devastation because of increased vulnerability owing to urbanization.

In order to cope with future earthquakes, several initiatives have been taken at national and local level . Currently, we are reviewing the National Disaster Management Act and National Disaster Management Plan based on Mauritius Strategy for further implementation of the Barbados Program of Action for SIDS and Hyogo Framework for Action, 2005-2015. National action plan on disaster management will be developed immediately after the review.

Suva Earthquake Risk Management Project

Suva Earthquake Risk Management Project (SERMP 1997), a multidisciplinary study designed to address risk posed by earthquake and associated tsunami on all sectors including education, envisioned school hazard resistant program in 1997. Several schools were involved for the field exercise for evacuation and drill in a SERMP follow up.

Schools are the primary target group for preparedness and awareness component of the follow up program. During the earthquake and fire drill field exercise, it is learned that schools need to develop evacuation plans & hold regular exercise together with relevant agencies and roles and responsibilities of teachers and school children should be clearly defined in those plans. Also, it is realized that schools should maintain communications equipment & contacts of response agencies. Another lesson was that the Ministry of Education (MOE) should develop a School Safety Manual focusing on all hazards, both natural and human caused.

Photo. Joeli

Report on UNCRD's School Project in Fiji

This was the context when the UNCRD/ UN DESA project on "Reducing Vulnerability of School Children to Earthquakes" started in 2005. We take the project with lot of enthusiasm as it is centered to safety of our children who are leaders of tomorrow and hold future of our country. Their destiny depends on the decision we make today as we have already witnessed thousands of school children killed in recent earthquakes in other countries.

For this project, we have conducted several consultative meetings with UNCRD officials and held stakeholders workshops. A steering committee has been established and special technical sub-committee under this is now currently working on assessment of selected schools. In the mean time, detailed TOR for the project has been developed and endorsed by National Disaster Management Council and Solicitor General among others. The technical committee has developed a questionnaire survey for assessment of all schools based on the field condition. The committee has carried out further technical evaluation of school buildings selected for intervention.

Assessment of School Buildings

The evaluation process developed the technical sub committee provides a systematic and uniform approach for engineers and technicians to use in deciding the Structural Performance Score (SPS) of a building with an assigned Grading of Seismic Risk.

We found that all buildings assessed failed to meet the earthquake safety standards with over 80% in the least and worst grade. This is an alarming finding which shows the importance and urgency of the matter.

Rasing Chilren's Awareness of Disasters

Currently, school children are participating in National Disaster Awareness Week in which we carry out several competitions and other awareness activities. Review of primary and secondary school curricula is underway, where disaster education will be incorporated. We think this is the one of the important process for institutionalization. In an effort to institutionalization process of disaster reduction in education sector, we are trying to mainstream Comprehensive Hazard and Risk Management (CHARM) into Ministry of Education's policies, plans and strategies.

The current UNCRD project created opportunities to standardize the school building plans and facilitated strong networking and partnership through multi-stakeholder approach under the Steering Committee. In this process, we have seen huge awareness on earthquake safety generated among stakeholders who are in steering committee, National Disaster Management Council, Budget and Ad Coordinating Committee, MPD and others. Further, we look this project as an opportunity to extend of disaster risk management structure as far down as community level will help consolidate community participation in development planning. Safe school in communities could be part of the Early Warning Dissemination System. We hope, it will also provoke for review of National Building Code to take into account Earthquake Safety considerations. This project will work in close cooperation with the EU school improvement project in Fiji for up scaling and the sustainability.

We have almost all schools to be intervened for safety of children against hazards including earthquakes, fire etc. This requires strong political commitment and huge resources. In order to achieve the goal, we think this project will provide strong base. The questionnaire developed for assessment will be used for the national level survey of all schools. The EU school improvement project will adopt the assessment methodology developed by the Technical Group. We also need to build IT capacity to maintain proper data base especially structural record of schools in the country.

International Workshop on Keeping Schools Safe from Earthquakes

Organized by UNCRD & NSET
1-2 June, 2006, Kathmandu, Nepal

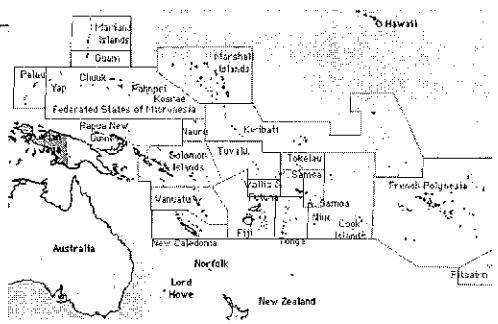
Fiji Case Study: Assessing Ongoing Initiatives/Our children are our future

By Joeli Rokovada, Director, National Disaster Management Office

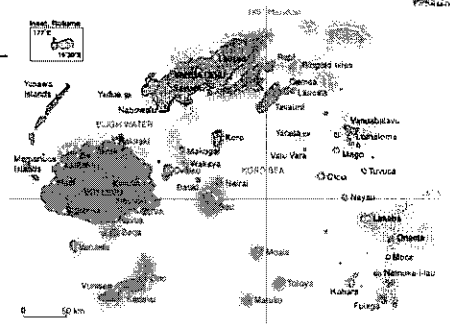
Outline

- Key facts and figures about Fiji
- Natural hazards that affect Fiji
- Hyogo and Pacific Framework for Action, 2005-2015 and National Action Plan
- Ongoing initiatives on school safety
- UNDESA/UNCRD initiative on Reducing Vulnerability of School Children to Earthquakes
- Opportunities and Limitations
- Lessons Learned
- Future Prospects

FIJI IN THE PACIFIC



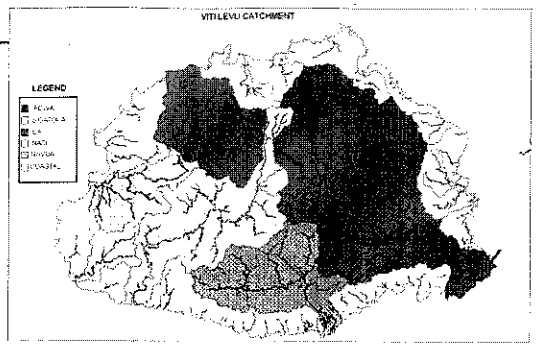
THE FIJI ISLANDS



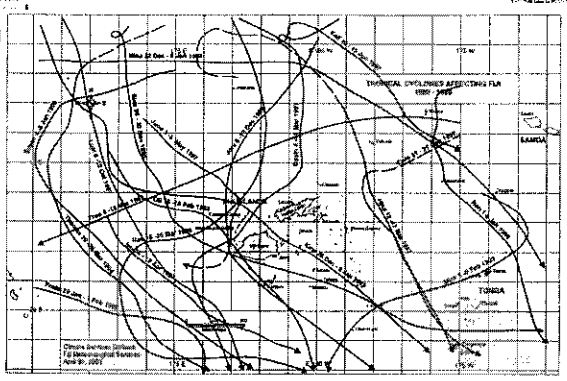
Fiji – Key Facts and Figures

Historical Background: 1643 – Abel Tasman sighted Fiji
1774 – Captain Cook visited Fiji
1874 – Fiji proclaimed a British Colony
1970 – Fiji became Independent
1987 – Fiji became Republic
1997 – Fiji rejoined the Commonwealth
Latitude: 15 – 22 S; Longitude 174E – 177W; Area: 18,272 sq. km
Population: 838,088 (2004)
Suva (Capital) – 85,000 (2004)
Est. annual rate of population growth: 1.2%
Annual Growth Rate of GDP: 8.2%
Visitor Arrivals – 430,800 (2003) Tourist Earnings- F$638.8 million
Average Annual Rate of Inflation – 4.3 (2001)
Dry season, May - October (1125mm)
Wet season, November – April (1898mm)

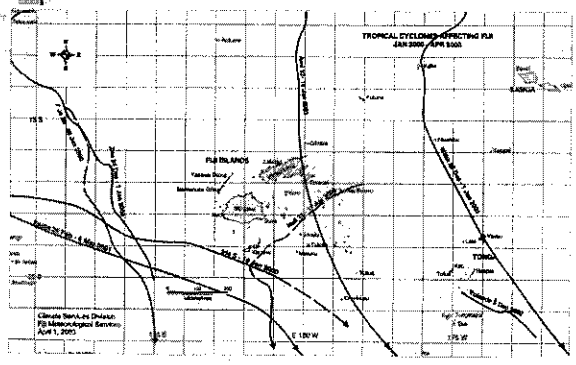
Hazards that affect Fiji - Flood



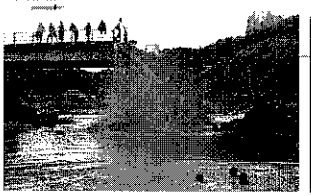
Tropical Cyclone Track 1990 - 1999

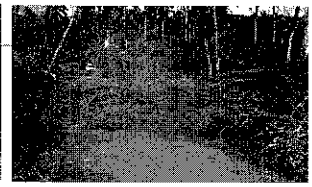


Tropical Cyclone Track 2000 - 2003



Damages Caused By Natural Disasters





Suva Seawall damaged by the Tsunami (1953) Earthquake Ms 6.6

Damage to Suva Wharf Caused By the 1953 Tsunami

Review of the Natural Disaster Management Act and National Disaster Management Plan

- The review is based on the Mauritius Strategy for further implementation of the Barbados Program of Action for SIDS, Hyogo and Pacific Framework for Action, 2005-2015.
- Encompasses six guiding principles
- National Action Plan to develop immediately after the review

Suva Earthquake Risk Management Project (SERMP)

- Multi-disciplinary study that involved 46 govt & non-government agencies based on the 1953 event.
- Designed to address potential risk posed by earthquake & associated tsunami on all sectors including education
- The Study comprised six main parts:

i) Hazard Assessment
ii) Vulnerability assessment
iii) Disaster Mitigation Measures
iv) Emergency Response Planning

SERMP

- Public Awareness and Policy Support
- Dissemination of findings

NOTE: The school hazard resistant program takes into account the foregoing six components

SERMP Follow-up

- Stakeholder workshop to review study recommendations, table top and tsunami evacuation field exercises in 1997, 2003 and 2004 involved several schools
- Preparedness and awareness are important components to meet the aim of the project. School are the primary target group
- SERMP provides the model for risk assessment in urban centres

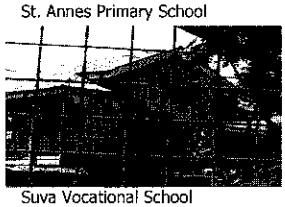
Lessons schools learnt from the Earthquake/Fire field exercises

- Schools to develop evacuation plans & hold regular exercise together with relevant agencies
- Roles and responsibilities of teachers and school children should be clearly defined
- Schools to maintain communications equipment & contacts of response agencies
- Ministry of Education to develop a School Safety Manual focusing on all hazards, both natural and human caused

UNCRD/UNDESA School Children Safety Initiative

St. Annes Primary School

Mahatma Gandhi Primary School



Suva Vocational School

Ballantine Memorial School Vocational

Why are our children important ?

- They hold the future of our country
- They are the leaders of tomorrow
- Their future destiny depends on the decision we make today

School Children make up 25.37% of Fiji's population

No. of Secondary schools	- 164
No. of Primary schools	- 720
Total:	- 884
No. of Primary school students	- 143,858
No. of Secondary school students	- 68,774
Total:	- 212,632

UNCRD Project: Reducing Vulnerability of School Children to Earthquake: Progress to date

- Consultations/planning with UNCRD officials
- Conduct stakeholder/UNCRD workshop
- Develop project TOR and MOU
- Establishment of Steering Committee
- Government endorsement – National Disaster Management Council, BACC, MPD and Solicitor General
- Development of Survey Questionnaire (Field Measurements required for initial earthquake evaluation of schools) by the Technical team

Reducing Vulnerability of School Children to Earthquake: Progress to date

- Completion of questionnaire by 10 schools
- Design of seismic structural assessment methodology
- Technical Group conducted further on site technical evaluation on 1 building in each of the 5 pilot schools.

Technical Evaluation Process

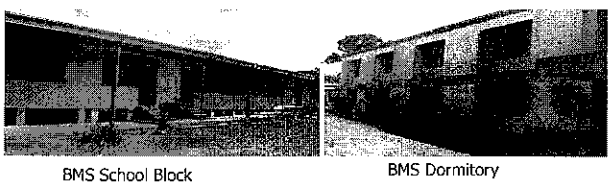
- The evaluation process provides a systematic and uniform approach for engineers and technicians to use in deciding the Structural Performance Score (SPS) of a building with an assigned Grading of Seismic Risk.
- An SPS score of less than 33 means the building fails to meet the minimum earthquake safety standards

Grade and Structural Performance Score (SPS)

Grade	A+	A	B	C	D (Fail)	E (Fail)
SPS	Greater than 100	100-81	80-51	50-34	33-20	Less than 20

Result of further On-Site Technical Evaluation

- All buildings assessed failed to meet the earthquake safety standards with over 80% bracketed in the least and worst grade.
- Ballantine Memorial School was the worst case scenario

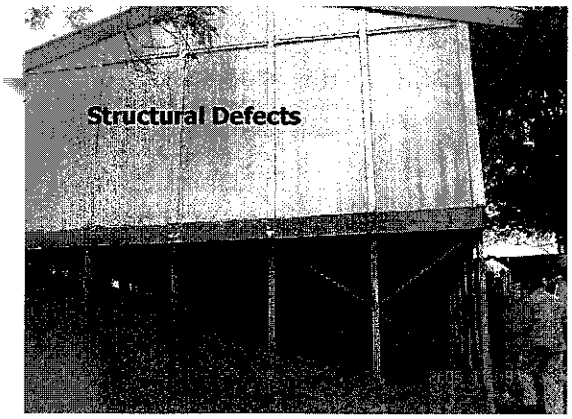


BMS School Block

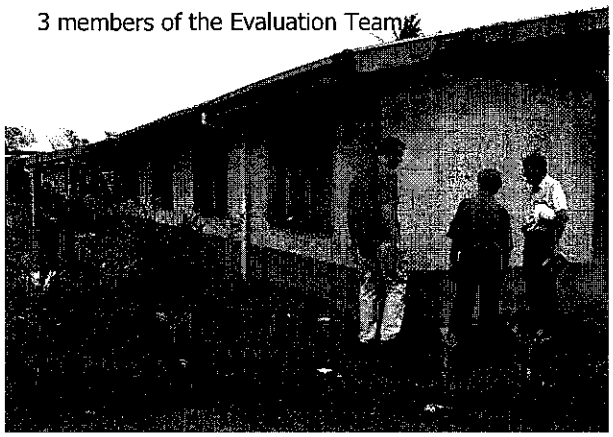
BMS Dormitory

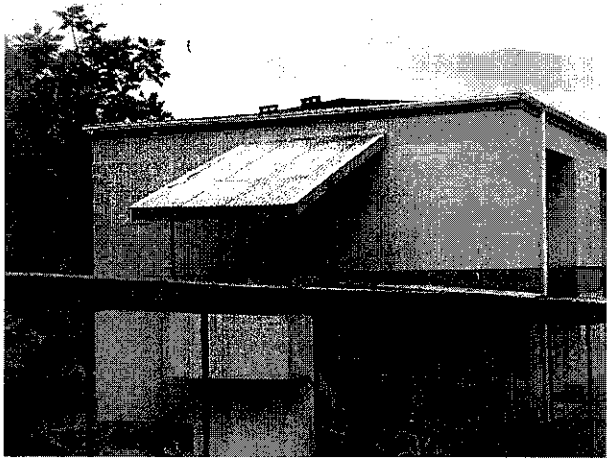
Mahatma Gandhi Primary School

BMS Vocational Kitchen



3 members of the Evaluation Team





Ongoing school safety initiative

- National Disaster Awareness Week – Participation of school children in competitions & awareness raising
- Appointment of designated OHS officers to look into health and safety aspects in schools
- Participation of school children in public awareness campaign

Ongoing school safety initiative

- Review of primary and secondary school curricula. This is part of the institutionalisation process
- DARMTAC's professional development and institutionalization programme
- Mainstreaming Comprehensive Hazard and Risk Management (CHARM) into the Ministry of Education's policies, plans and strategies

Opportunities

- Standardization of school building plans
- School building plan to adopt an all hazard approach
- Strong networking and partnership through multi-stakeholder approach under the Steering Committee
- Awareness on earthquake safety generated during the project's planning process within the Steering Committee, National Disaster Management Council, Budget and Ad Coordinating Committee, MPD and agencies involved

Opportunities

- Safe school buildings will enhance safety of evacuation centres and the evacuees and boost public confidence
- Ministry of Education to adopt CHARM as a project planning/appraisal tool for its school building and other infrastructural development
- Extension of disaster risk management structure as far down as community level will help consolidate community participation in development planning

Opportunities

- Review of National Building Code to take into account Earthquake Safety considerations
- Schools to be part of the Early Warning Dissemination System
- The UNCRD project to work in close cooperation with the EU school project in Fiji for the sustainability of the project

Limitations

- Schools are not adequately safeguarded against earthquake putting lives of school children at risk in virtually all schools
- Lack of preparedness and other measures to mitigate fire hazards particularly provision of adequate egress in double storey girls dormitory in BMS. What exists are death traps
- Lack of political & financial commitment

Future Prospects

- To undertake a national survey of all schools using the survey questionnaire that has been developed
- Capital input and technical resources to successfully implement the activities planned during the project period.
- EU school project to adopt the assessment methodology developed by the Technical Group
- IT capacity to maintain proper data base especially structural record of schools in the country

Future Prospects

- UNCRD to work in partnership with donors like the EU, eg; Fiji project

DHANYABAD

School Earthquake Vulnerability Reduction in Indonesia

Krishna Pribadi
Associate Professor, Institute of Technology Bandung (ITB), Indonesia

Summary

Importance of Earthquake Safe School Buildings

Indonesia is an earthquake prone country. Many earthquakes in Indonesia have caused deaths and damages due to the high vulnerability of the community.

One of them is school buildings and the people inside. The earthquake which can happen in a matter of time, without any warning, often causes serious damages on schools in Indonesia due to the vulnerability of the buildings. The damaged school buildings affect seriously the school community and the learning activities in school and later on can put the buildings, temporarily or permanently, out of function. The collapsing buildings or falling object during the shaking can injure the students, teacher, and other school members. For this reason, earthquake safe school building is very important.

Besides its normal function as a learning place, the school buildings in Indonesia are also frequently used as post-disaster temporary shelters by the surrounding communities. An earthquake safe school building should not collapse during the disaster, must not contain unsecured falling objects and other non-structural items that can hit teachers or students in earthquakes and must be capable of evacuating the people inside the building quickly and safely into a well planned evacuation place.

Raising Awareness of Community through Schools

Besides the structural mitigation efforts i.e. safer school buildings and materials, it is important to increase the school community awareness through community-based vulnerability reduction in school. In community-based vulnerability reduction program in school, the emphasis is on the local community that participates in coping with the hazard, focusing on mitigation efforts to reduce the elements of school vulnerability, involving all "stakeholders".

The important element of this community-based concept is sustainability, which should be founded on the commitment of the involved community members. One of the efforts of having the sustainability of the community-based school vulnerability reduction is to increase the community awareness in understanding the hazard and the various ways to reduce their vulnerabilities. This can be achieved through following well knitted actions comprehensively:

§ Strengthening/retrofitting of school building construction to have earthquake safer ones, which will need training to the stakeholders; appropriate planning and design; reliable supervising; and regular building maintenance
§ Training of school committee, designer, supervisor, and craftsmen who are involved in school building construction
§ Introducing the natural earthquake phenomena to the students more accurately
§ Training for proper and safe conduct during earthquake and emergency response to the earthquake disaster
§ Preparation of materials which can be used to raise community awareness

Activities of Institute of Technology Bandung (ITB)

Institute of Technology Bandung (ITB) has carried out vulnerability reduction activities for schools in the past. It had implemented the training to the community school, training of trainers (TOT). The TOT was given to the elementary school teachers expecting that they can disseminate the knowledge they have learned from the training and would apply

Photo. Krishna Pribadi

to other community school members in their city/ district. Up to the year 2005, there have been 8 batches of implementation of the TOT program held by ITB in collaboration with the Ministry of National Education (MONE), involving more than 800 participants from earthquake prone districts and provinces all over Indonesia.

The TOT program also develops the manual and workbooks for teacher and students containing information on earthquake hazard and ways to reduce the earthquake vulnerability in school environment, including earthquake comic book for children; pictorial dictionary, etc.

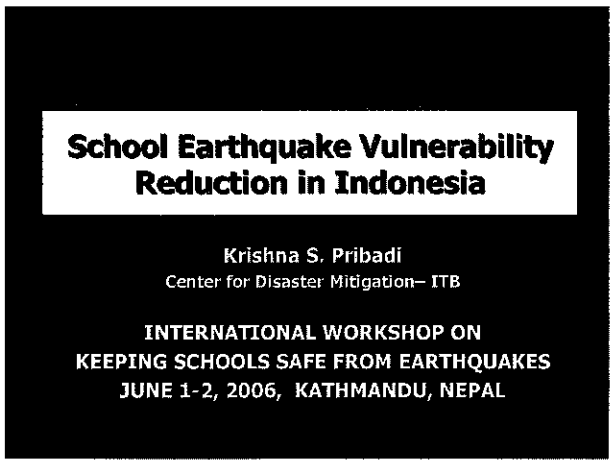
Various techniques for retrofitting and strengthening school buildings, mostly in post-disaster areas, have also been introduced and implemented, which includes the vulnerability analysis of the school buildings, design of the retrofit and strengthening measures, and implementation of the construction and supervision activities in various damaged school buildings in Indonesia.

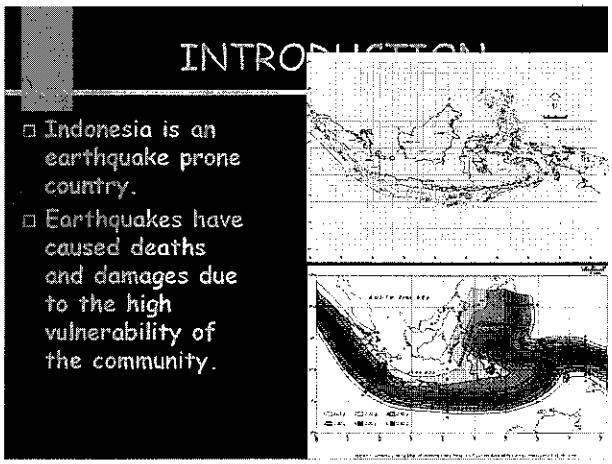
UNCRD's School Project in Indonesia

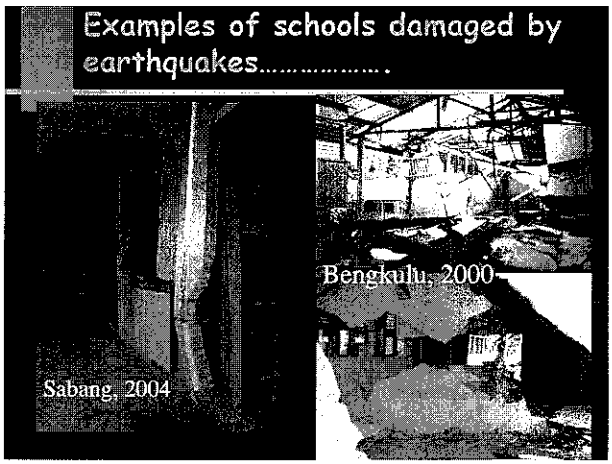
The current project on "Reducing vulnerability of school children to earthquakes" with UNCRD is built upon the achievements and lessons from these activities. Thus, the objectives of the project are to the seismic safety of schools through retrofitting of school buildings, disaster education, training of teachers and students and o build safer communities through demonstration, trainings, and community workshops.

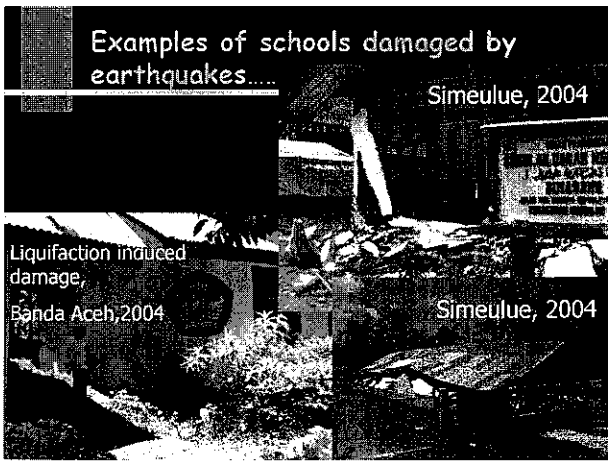
The major components of the project are school building retrofitting and reconstruction in Aceh area as demonstration case of appropriate technology, technicians and masons trainings, Earthquake awareness program and publication (teacher's training and students drill) and dissemination activities.

Through these efforts of earthquake safer school building and school community awareness program for improved disaster preparedness, hopefully our students as the Indonesian next generation can be protected from earthquake hazard.

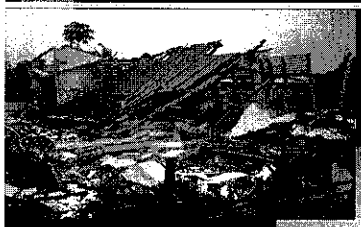




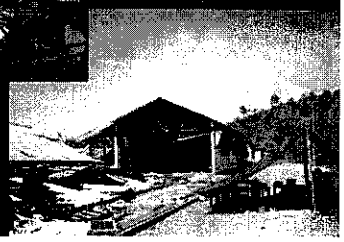




Examples of schools damaged by earthquakes.....



Nabire (SD Bakti Mandala, 6 Februari 2004) (courtesy Teddy Boen)



Liwa (16 Februari 1994) (courtesy Teddy Boen)

Tsunami damaged school (Pidi,Aceh, 2004)

Tsunami damaged school

Schools in Indonesia.....

- The meeting place of different people during school hours -7h00-17h00 (second shift) :
  - School children (elementary: 200 to 400 people)
  - teachers (elementary: 10 - 20 people)
  - Other people (working staffs, administration staffs, school guards, etc , elementary school 10-15 people)
  - The parents
  - Guests

Schools in Indonesia.....

- Often used as post-disaster temporary shelter, when they are unaffected by the disaster

Simeulue, 2005

Earthquake Safer School building.....

- Does not collapse when struck by strong earthquake
- Does not harm people from falling object and materials, including harmful substances, inside or outside
- Must be capable of safely evacuating people from inside the building to a safer place during emergency situation

Limited Open space and access increase the school vulnerability, difficult to evacuate people safely in case of emergency

Community Based Vulnerability Reduction Program in School (1)

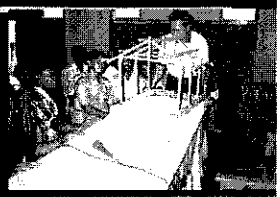
- Community-Based xxxxx approach
  - Community-based development
  - Community-based disaster preparedness
  - Community-based xxxxxx
- Emphasizing the role of the local school community in conducting the process of reducing the earthquake vulnerability of their school
- School community awareness activity is the entry point for this program

Community Based Vulnerability Reduction Program in School (2)

- Involving all "stakeholders" related to the school environment:
  - School children
  - Teachers
  - The parents
  - School committees
  - Others related to school construction (local government agencies, contractors, craftsmen, etc)
  - Other people outside the school
- From people to people
- Benefiting from external experts support

Training on school building good practices for earthquake resistance for :

- local government engineers and technicians
- local contractors and local craftsmen
- school committee members
- school principals and teachers

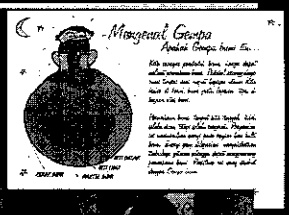


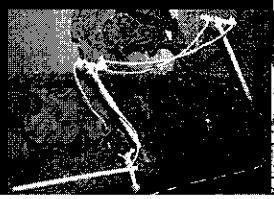
Training for Local Mason

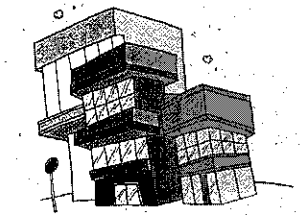
- Current non-engineered construction used in school buildings (reinforced concrete confined masonry work)
- Proper set up of concrete beams and columns , reinforcing steels
- Proper brick laying and anchoring

School Children Earthquake Awareness Program

- School children learn earthquake basics in a fun environment



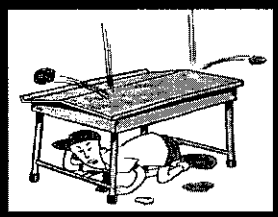




rdous Objects ...

School Children Earthquake Preparedness Drill

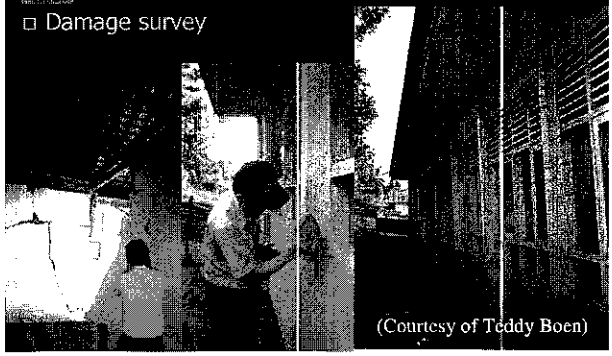
- Earthquake drill for self protection during earthquake



School Children Earthquake Learning Materials

Retrofitting Earthquake Damaged Schools

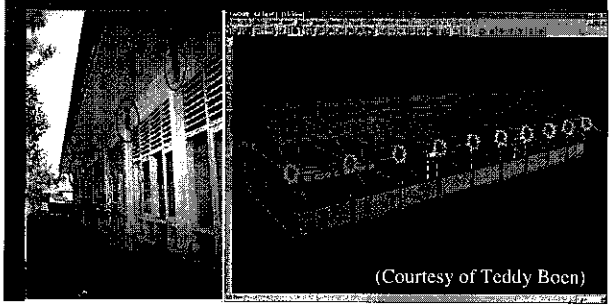
- Damage survey



(Courtesy of Teddy Boen)

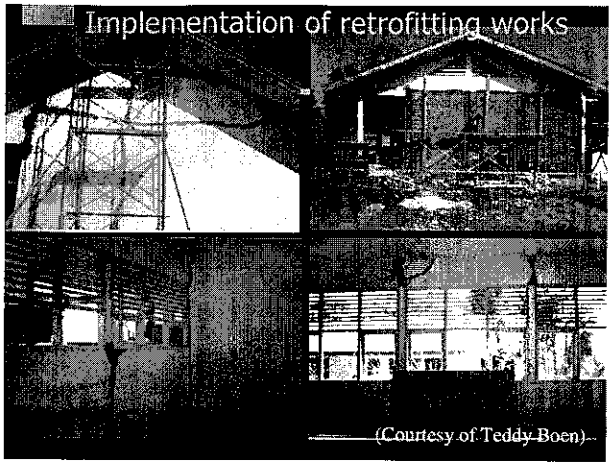
Retrofitting Earthquake Damaged Schools

- Damage Analysis and Modelling



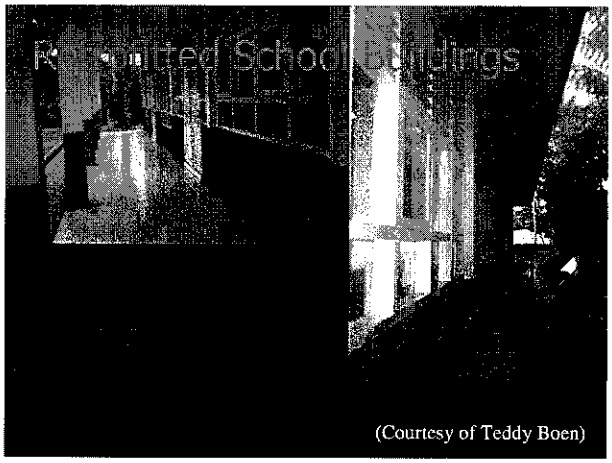
(Courtesy of Teddy Boen)

Implementation of retrofitting works



(Courtesy of Teddy Boen)

Retrofitted School Buildings



(Courtesy of Teddy Boen)

Goal of the School Safety Project in Indonesia

Objectives

- ✓ To enhance the seismic safety of schools through retrofitting of school buildings, disaster education, training of teachers and students
- ✓ To build safer communities through demonstration , trainings, community workshops
- ✓ Disseminate the culture of safe schools and safer communities

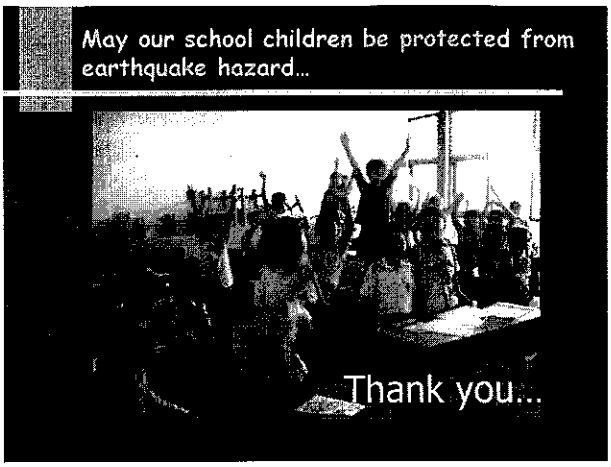
Components

1. School Building Retrofit/Seismic Reconstruction
   - Guideline for Eq.-resistant Construction
2. Technician/Mason Training
   - Training manual
3. Earthquake awareness program and Publication (teacher's training and students drill)
   - children's book on how to live with disaster
4. Dissemination of the practice at the national (and international) level
   - National , regional and international workshops

Approach

- Take Appropriate-Tech option: possibility of digestion and replication
  - Emphasize on local materials, manpower, building types and technology
  - Raise local manpower through on-job-training
- Focus on overall seismic safety of school not only building-Seismic resiliency of community not only school
- Transfer ownership of concepts and programs to community
- School program as awareness raising and capacity building opportunity

Aim for Indonesia


May our school children be protected from earthquake hazard...
Thank you...

School Safety Initiatives in India

Manu Gupta
Co-Director, SEEDS, India

Summary

Gujarat Earthquake in 2001

It was a public holiday in India and all schools were closed when a large earthquake hit Gujarat on 26th January 2001 claiming more than 13 thousands people. Still, large number of students and teachers were killed by the earthquake as they were celebrating the Republic Day of India. Nearly 2000 school buildings were destroyed by the earthquake in Gujarat. This fact underscores the importance of school safety in Gujarat and other sates of India where disasters are common.

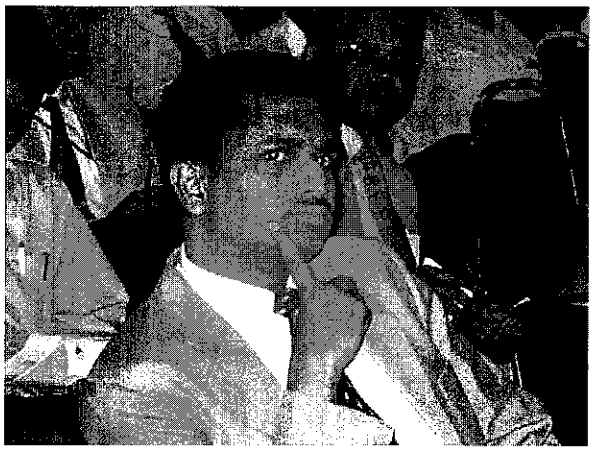


Photo. Krishna Pribadi

SEEDS and School Safety Initiatives

The SEEDS has conceived Gujarat School Safety Initiative jointly with Gujarat State Disaster Management Authority (GSDMA). The initiative has a program to target 150 schools in three cities of Gujarat in a pilot basis for school safety activities and training programs for trainers on school safety in 25 districts. Apart from Gujarat, SEEDS, currently, is carrying out school safety program in Delhi, Himanchhal, Orrisa and Andaman & Nicobar Islands with various national and international organizations including state governments, DIPECHO, UNCRD and others. The total project cost in school safety is about USD one million.

The initiative aims to promote disaster safety in schools through education, awareness, planning & demonstration and assist schools in preparing for future disasters. Development of effective tools and other teaching material and capacity building for teaching instructors are other objectives of the initiative. The physical intervention to school buildings for strengthening their resistance to disasters serves as model for safe communities. All these are towards promoting a culture of disaster reduction in school communities in India.

Concept of the Project Approach for School Safety

The project approach for school safety follows the concept of Dr. Daisuke Ikeda for UNESCO Decade for Education for Sustainable Development (2005-2015) – Seeds of Change. We focus on school children who are the agent for change of society. Building a culture of prevention in students by stimulating them under various learning environment is the approach we are taking for this project. Students learn from experience and simulation, practice through drills and other forms of fun activities and they are encouraged to carry out class and school projects on disaster education. Various opportunities are developed and used for disaster education to school children.

We are taking basic disaster education as a fist step towards school safety and then followed by development of school disaster management plan and non structural mitigation before making safe building structures which is to ensure 100% safety of school. The approach also considers the limitation of resources as the first three steps can be achieved at minimum cost and structural intervention obviously incurs high cost.

Project Methodology

We intervene in schools in a logical order of activities starting from inviting school s to participate in this initiative. Then, school teachers, management committee members and students get orientation on the initiatives. Rapid Visual Survey of school buildings to assess vulnerability is carried out at the same time. Meeting with school management, teachers and students representatives are held to prepare School Disaster Management Plan. Awareness and training

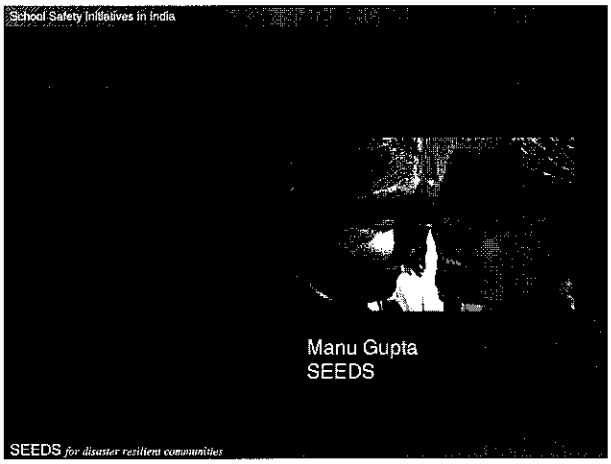
programs to students including Duck- Cover- Hold exercise are carried out and meetings are held with parent teachers association to make dissemination outreached. In next stage, mock earthquake drills are carried out and non-structural mitigation are demonstrated in schools. With this much of ground work, retrofitting of schools are initiated. Finally, school safety clubs are formed in schools. During the school safety program, regular interactions with school students are maintained through news letters, workshops and competitions.

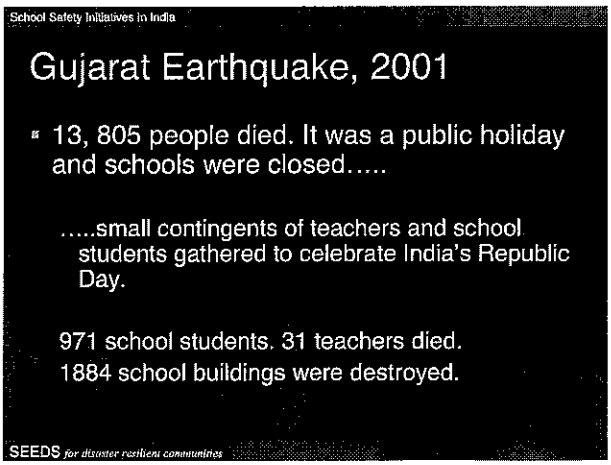
Products

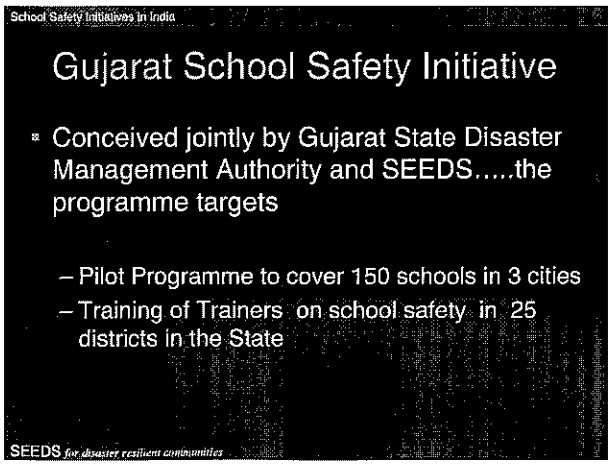
Several materials have been developed as product of the school safety program. School text books for class 7, 8, and 9 have been prepared. Other games, posters, films are developed for all age groups of school children. Handbooks on school disaster management plan and non-structural mitigation are prepared and training materials on disaster safety for teachers, students and masons are also developed during the program.

School earthquake Safety Initiative: Himanchal Pradesh

We have number of partners for School Earthquake Safety Initiative in Himachal Pradesh. Department of education of government of Himachal Pradesh is actively involved in this initiative where SEEDS is carrying out the projects with DIPECHO and UNCRD. The major activities in Himachal would be school retrofitting and trainings targeting teachers, management members and students. The major challenge ahead is how to effectively translate the lessons learned further into the concrete actions on the ground. As we need huge resource to reach out all school children, the question remains on how to manage such resource and on time to accomplish the goal. In summary, the major challenge is achieving sustainability of our initiative.







School Safety Initiatives in India

Building Awareness in School Safety

- SEEDS carrying out School Safety Programme in 5 regions in India.
  - Gujarat *with Govt. of Gujarat*
  - Delhi *with Geo Hazards Intl, Govt. of NCT Delhi*
  - Shimla & Kangra *with UNCRD, DIPECHO, Christian Aid, Govt. of HP*
  - Orissa *with Christian Aid*
  - A&N Islands *with ADRC, Private citizen donors*
- Total Project Cost (2005-07) : USD 1.0 million (approx.)

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

"Promoting a culture of disaster reduction in school communities in India"

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

- Promote disaster safety in schools through Education, Awareness, Planning & Demonstration.
- Assist schools in preparing for future disasters
- Prepare tools and teaching material on school safety.
- Build capacity of teaching instructors on disaster safety
- Strengthen school buildings to serve as models of safe communities

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

- Red whistle: alerting the community
- Child with wide open arms: ready to play a lead role to ensure safety
- Safety Helmet: protection for school children & safeguard for rest of the community
- Shield: defence against hazards & a badge of recognition for safe schools

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

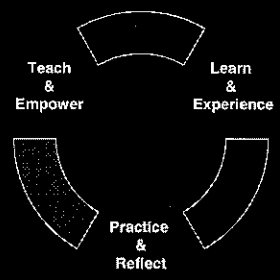
Project Approach

- Draws inspiration for Dr. Daisaku Ikeda's proposal for UNESCO Decade for Education for Sustainable Development (2005-2015), proposal

"Seeds of Change"

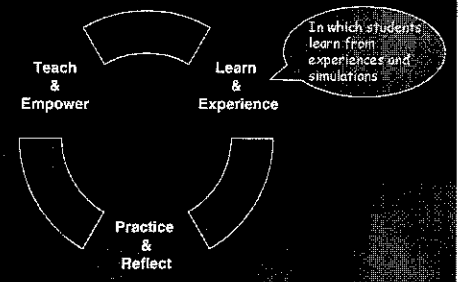
SEEDS *for disaster resilient communities*

School Safety Initiatives in India



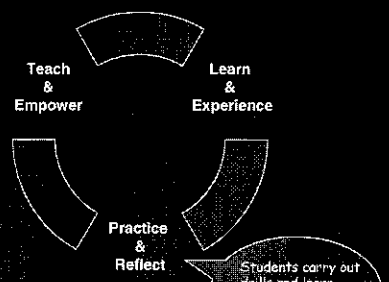
SEEDS *for disaster resilient communities*

School Safety Initiatives in India

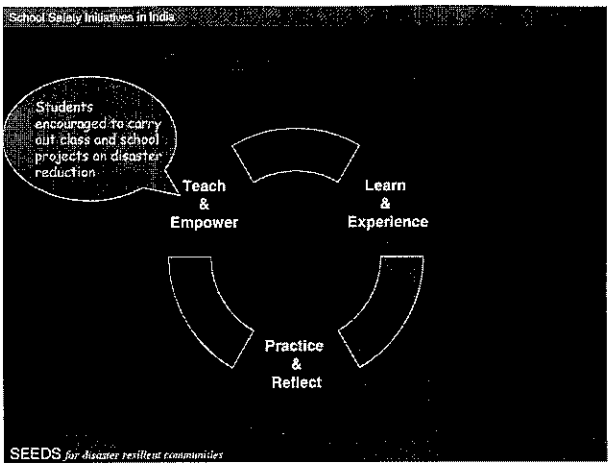


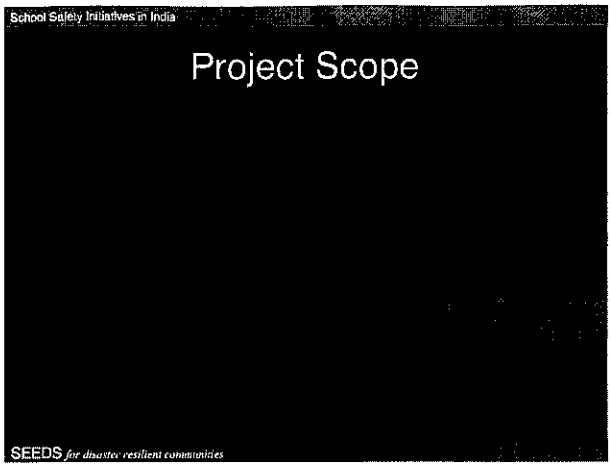
SEEDS *for disaster resilient communities*

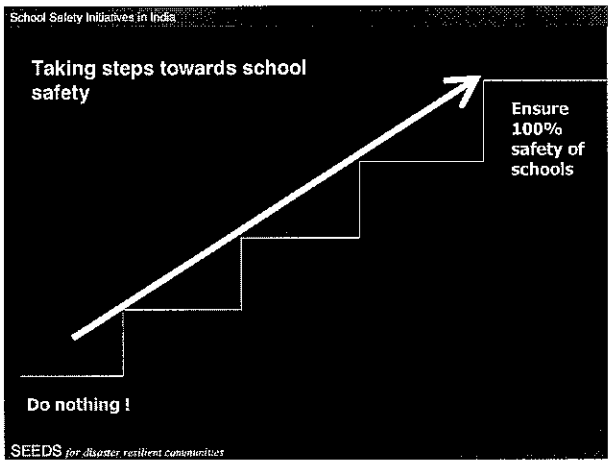
School Safety Initiatives in India

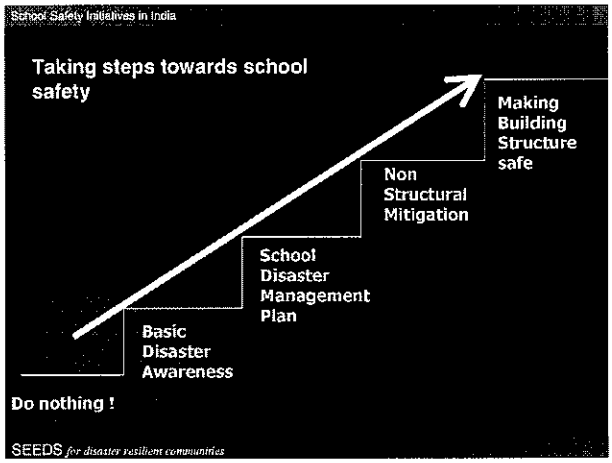


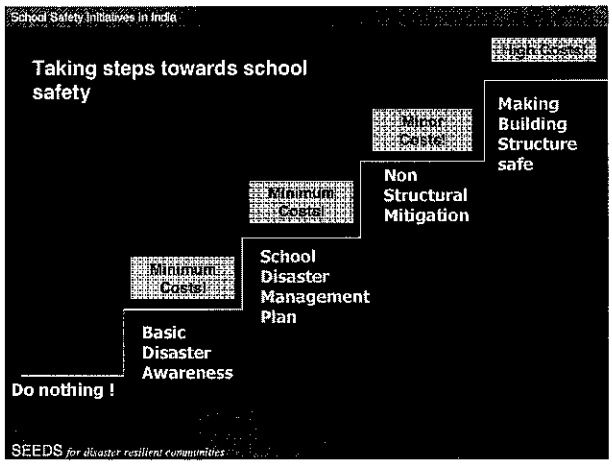
SEEDS *for disaster resilient communities*

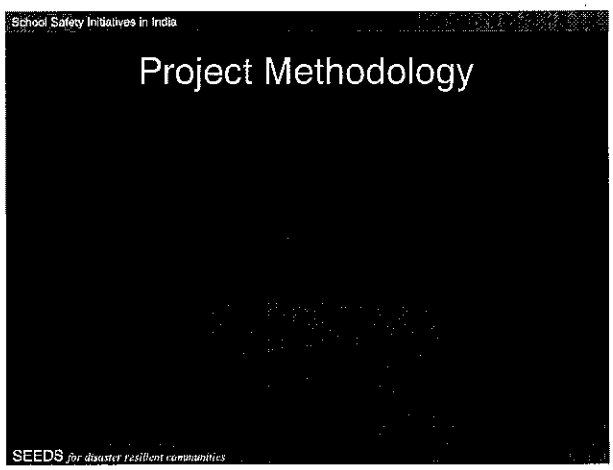

School Safety Initiatives in India
Students encouraged to carry out class and school projects on disaster reduction
Teach & Empower
Learn & Experience
Practice & Reflect
SEEDS for disaster resilient communities

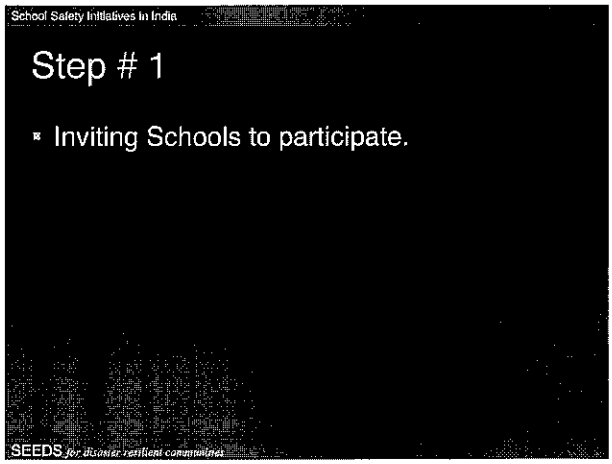

School Safety Initiatives in India
Project Scope
SEEDS for disaster resilient communities

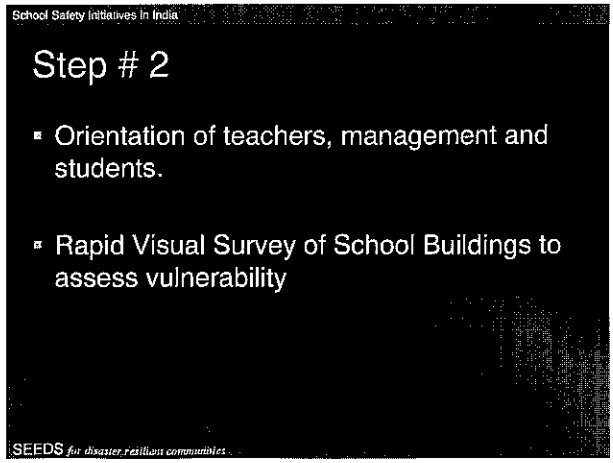

School Safety Initiatives in India
Taking steps towards school safety
Ensure 100% safety of schools
Do nothing !
SEEDS for disaster resilient communities


School Safety Initiatives in India
Taking steps towards school safety
Making Building Structure safe
Non Structural Mitigation
School Disaster Management Plan
Basic Disaster Awareness
Do nothing !
SEEDS for disaster resilient communities


School Safety Initiatives in India
Taking steps towards school safety
Making Building Structure safe
Non Structural Mitigation
School Disaster Management Plan
Basic Disaster Awareness
Do nothing !
SEEDS for disaster resilient communities


School Safety Initiatives in India
Project Methodology
SEEDS for disaster resilient communities


School Safety Initiatives in India
Step # 1
Inviting Schools to participate.
SEEDS for disaster resilient communities


School Safety Initiatives in India
Step # 2
Orientation of teachers, management and students.
Rapid Visual Survey of School Buildings to assess vulnerability
SEEDS for disaster resilient communities

School Safety Initiatives in India

Step # 3

- Meeting with School Management, Representative Students and Teachers for the preparation of School Disaster Management Plan.

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

Step # 4

- Awareness and Training of all Students
  - About Disasters
  - Duck, Cover, Hold Exercises
  - Fire Safety, Search & Rescue, First Aid Training
- Meetings with Parent Teacher Associations
- Initiate Work on Retrofitting

SEEDS *for disaster resilient communities*

Rescue Training, Gujarat

School Safety Initiatives in India

Step # 5

- Mock Earthquake Drills
- Retrofitting in schools initiated
- Non-Structural Mitigation Demonstrated

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

Non Structural Mitigation, New Delhi

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

Step # 6

- School Safety Clubs are formed
- Regular ongoing interaction with school students through newsletters, workshops and competitive events

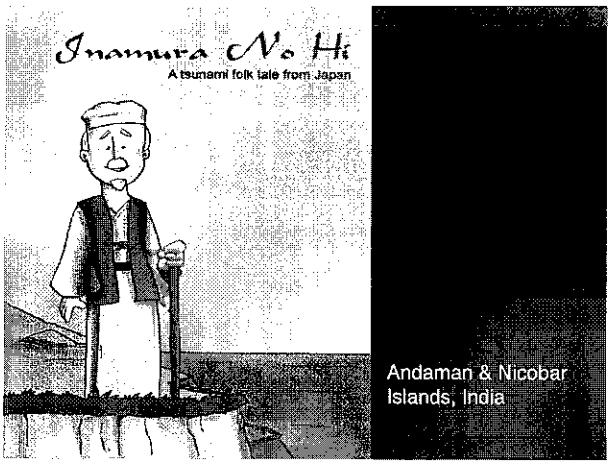
SEEDS *for disaster resilient communities*

School Safety Initiatives in India

ities

1. Books & Games on Basic Disaster Awareness
2. a. Mock Drills on School Safety
   b. Training of Task Forces in Search and Rescue, First Aid, Coordination, Safety Issues
3. Hazard Hunt in Schools for Non-Structural Mitigation
4. Retrofitting of School Buildings

SEEDS *for disaster resilient communities*



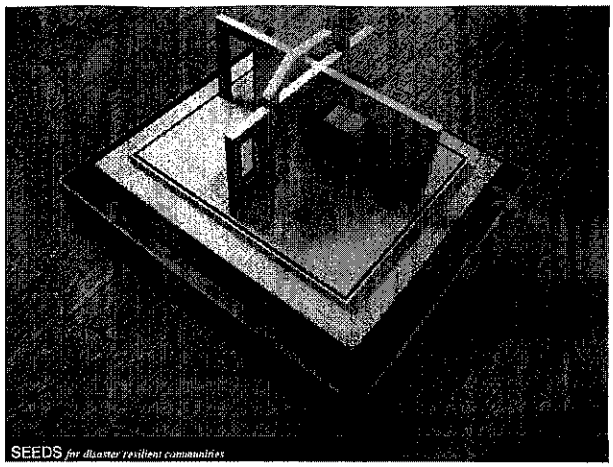
Andaman & Nicobar Islands, India

School Safety Initiatives in India

Products

- School Text books for Classes 7,8,9
- Games, Posters, films for all ages
- Handbooks on
  - School Disaster Management Plan
  - Non Structural Mitigation
- Training Manuals and teaching kits
- News Letters
- School Safety Clubs & Networks
- Training Material for Engineers and Masons

SEEDS *for disaster resilient communities*

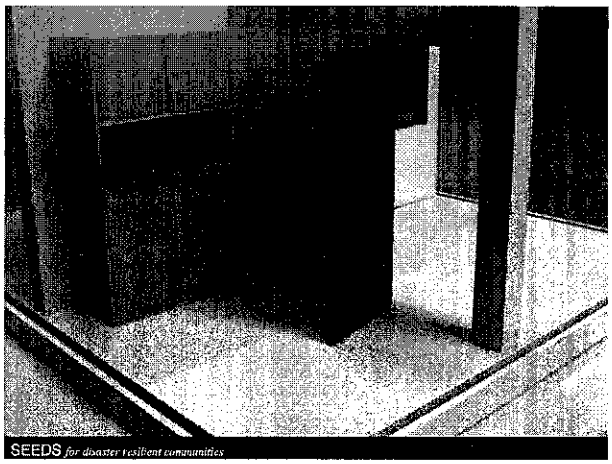


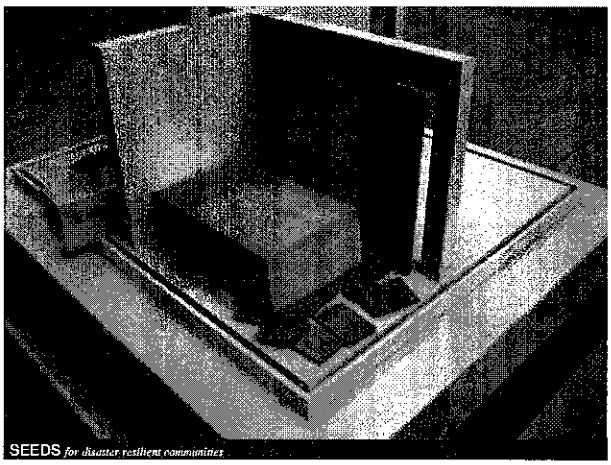
School Safety Initiatives in India

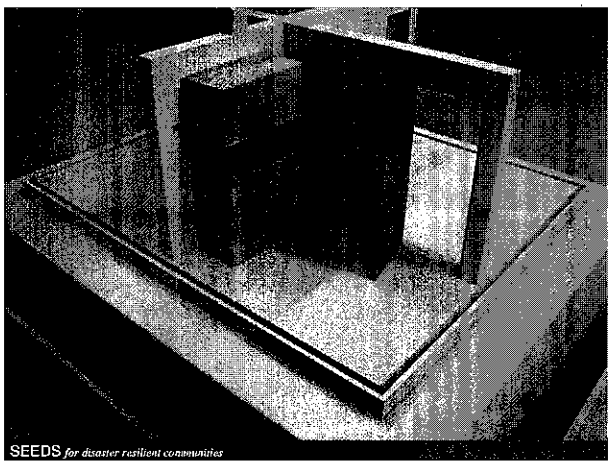
Table Top Model

- Purpose
  - Simulated Demonstration of Eq for falling hazards
- Target Audience
  - Citizens, Children, Teachers
- Structure
  - Two models : One normal, the other non-structurally mitigated.

SEEDS *for disaster resilient communities*



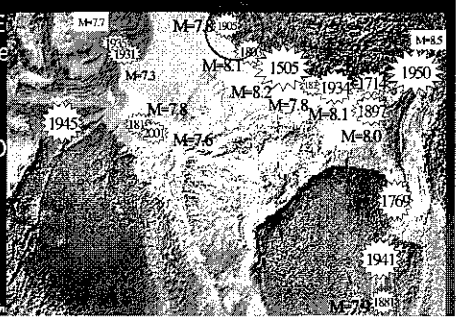




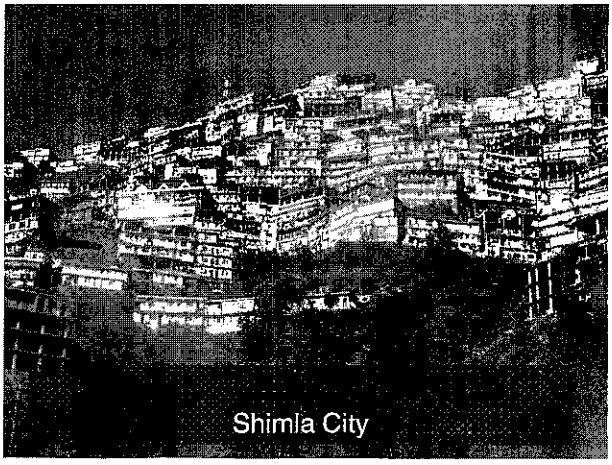
School Safety Initiatives in India

School Earthquake Safety Initiative, Himachal Pradesh

- Partners
- Dept. of E… Governme… Himachal
- UNCRD
- DIPECHO
- SEEDS



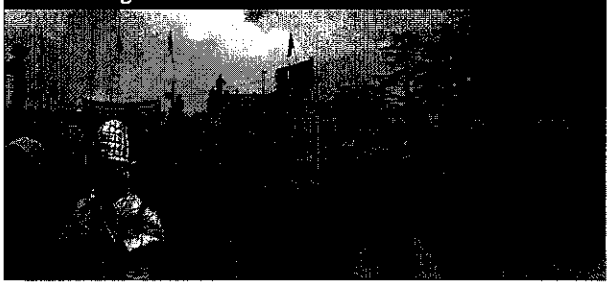
SEEDS *for disaster resilien…*



School Safety Initiatives in India

Creating models for safe community

- Schools would be retrofitted, and teachers, management & teachers trained in BDA.



School Safety Initiatives in India

Challenges ahead

- Translating experiences into lessons learnt ...further into actions on the ground.
- Reaching out to all school children....how much time, resources ?
- Sustainability

SEEDS *for disaster resilient communities*

School Safety Initiatives in India

Thank you

www.seedsindia.org

SEEDS *for disaster resilient communities*

Earthquake Safety of School Children in Uzbekistan

Samil Khakimov, Head of Design Department, UzLITTI, Uzbekistan
Khusan Tursonov, HAYOT

Summary

Earthquakes in Central Asia

Earthquakes are evident throughout the Central Asia in the past. Almaty, Tashkent, Dushanbe, Bishkek, Ashgabad, major cities in the region, are all located in areas of high seismic risk. Uzbekistan was hit several times by medium and large earthquakes in the past decades. The Tashkent Earthquake (1966), Gazil Earthquake (1984), Gumori Earthquake (1988) and others revealed the vulnerability of prevailing construction practice of masonry and frame panel buildings.

Seismic Vulnerability of School Buildings

School buildings made up of adobe and brick masonry, frame panel and RC with brick infill were also heavily damaged by those earthquakes. School buildings in cities and villages of Uzbekistan are of different ages and construction materials.

Seismic hazard of sites of these schools have been characterized under different ground shaking intensities ranging from MSK V to MSK IX or higher with set of probable return periods. School buildings are also classified by material and construction types such as adobe, brick, field stone, wooden frame with adobe infill, burnt brick, brick walls strengthened with RC elements, silicate brick and RC frame-panel buildings. Vulnerability matrix of these buildings under different level of damage is established against earthquakes of intensity MSK VIII and IX for all these categories. Non-engineered adobe and brick masonry buildings without reinforcement suffer partial or total collapse in MSK VII or higher intensity shakings. Building of pre-cast large panel system may have only slight damage under this level of shaking.

School Building Assessment

"State National Program of Development of School Education"

Recently, a five year program, "State National Program of Development of School Education (2004-2009)" has been launched in Uzbekistan. One of objectives of the program is to provide earthquake safety to school buildings. Under this program, more than 10,000 school buildings were assessed for the seismic risk. The result of the assessment shows that more than 25 % of school buildings will suffer significant damages and 10% buildings would collapse in prevalent earthquake shaking hazard.

It was recommended that about 10% of school buildings should be pulled down and reconstructed with a protection measures with guarantee that they remain functional after maximum probable earthquakes. Other vulnerable school buildings would be retrofitted to withstand the probable earthquakes.

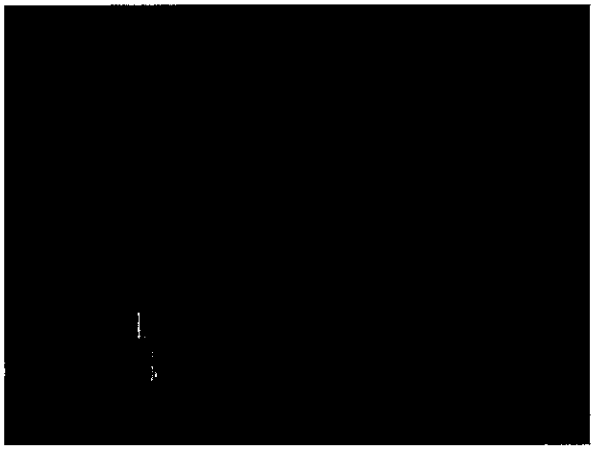


Photo. Samil Khakimov

Seismic Retrofitting and Education/Training Program

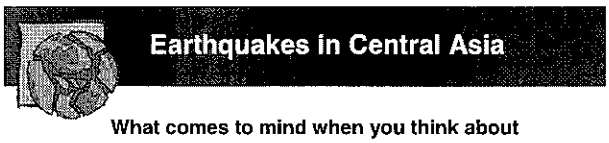
For seismic retrofitting of buildings, various reinforcement methods were developed addressing different materials and construction types in Uzbekistan and they are being implemented successfully. Various means of seismic retrofitting were implemented in school and college buildings of RC frame, masonry wall, stone masonry, adobe and RC frame panel.

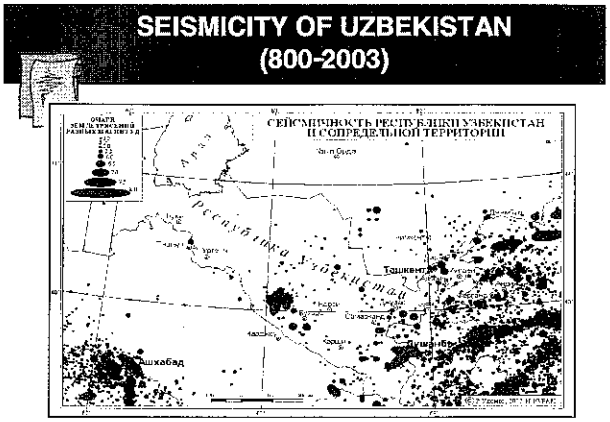
Apart from these retrofitting constructions in school buildings, special educational/trainings programs are being carried out in schools for children. These educational activities emphasize to develop understanding of hazards and procedural behavior before, during and after emergency. Relatively safe and unsafe places within school buildings are located and children are informed on how to make self protection and safe evacuation. In this process, several

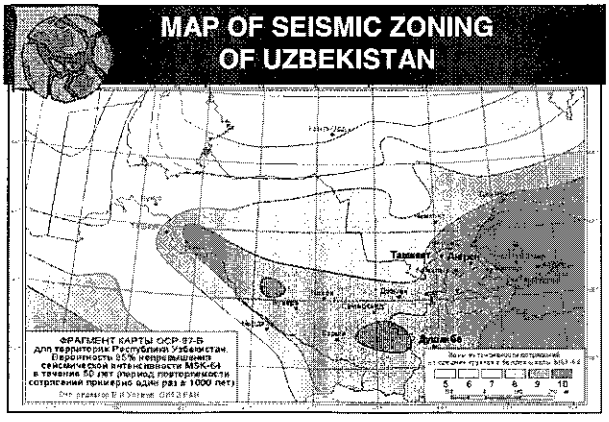
Dock-Cover-Hold exercises are carried out in schools. We found that school children more confident of their safety after these kinds of drills and exercises.

We are taking the initiatives from UNCRD as an opportunity to shape our school safety program comprehensively and make use of existing knowledge and experience for larger dissemination and up scaling. The project benefits not only Uzbekistan but central Asian region disseminating the concept and tools through out the region.

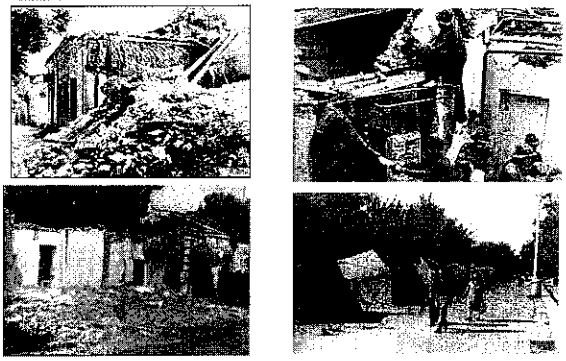
Photo. Khusan Tornosov





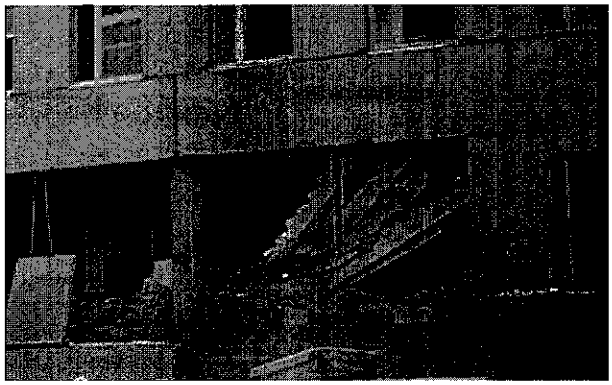


Tashkent, Uzbekistan 1966



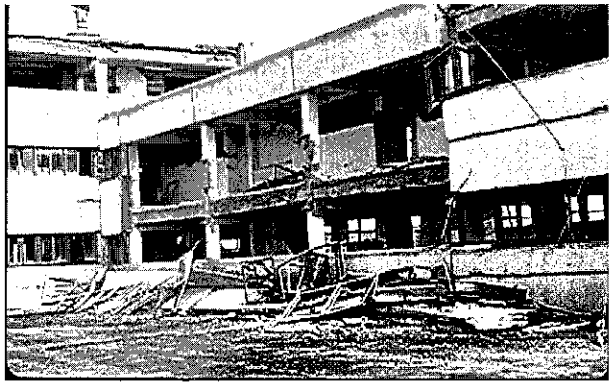
Damage of masonry school building, Gazli 1976

Damage of frame panel building, Gumri 1988



Damage of frame panel school building, Gazli 1984

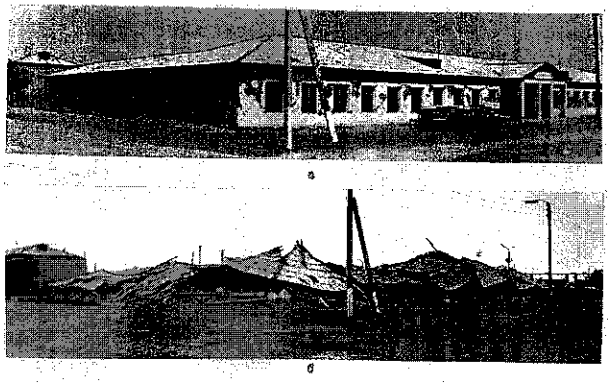
Damage of frame panel school building, Gazli 1984



Damage of masonry school building, Gazli 1984

Damage of RC frame with brick filling school building, Gazli 1984

Damage of adobe brick school building: a – 8.04.1976; b- 17.05.1976



School buildings in cities and villages of Uzbekistan have various age and are constructed with application of different materials. Seismic hazard of territories of school building sites is characterized by intensity of earthquakes from 5 up to 9 and more units with various repeatability and various prevailing spectra of movement.

Classification of school buildings by constructive type in cities and settlements of Uzbekistan has been developed. A prevailing material of walls are: adobe; adobe brick, natural stone, wooden frame with adobe fill, burnt brick, brick walls strengthened with RC inclusions; silicate brick and RC frame - panel buildings.

In Republic Uzbekistan the "State National Program of Development of School Education for years 2004-2009" has been accepted.

One of objectives of the program was provision of earthquake safety of school buildings. For more than 10000 school buildings were evaluated their seismic risk. As a result of such estimation it is established, that more than 25 % of buildings of schools at earthquake of various intensity will have damage exceeding 3 degree, and about 10 % may be collapsed.

Building Vulnerability in Response to MSK VIII & IX

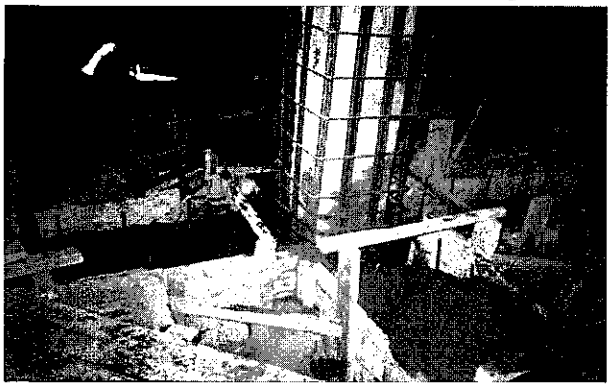
	SLIGHT DAMAGE	MODERATE DAMAGE	HEAVY DAMAGE	PARTIAL COLLAPSE	TOTAL COLLAPSE
UNENGINEERED ADOBE AND UNREINFORCED MASONRY					
BRICK WALLS, WOODEN FLOORS, 1-2 STOREY <1955 (20%)					
BRICK WALLS, RC PRECAST FLOORS, 3-5 STOREYS <1957					
BRICK WALLS. RC PRECAST FLOORS, SOME SEISMIC DETAILING >1957					
PRECAST RC FRAME, WELDED JOINTS, BRICK INFILL, 4-9 STOREY					
PRECAST LARGE PANEL SYSTEMS					

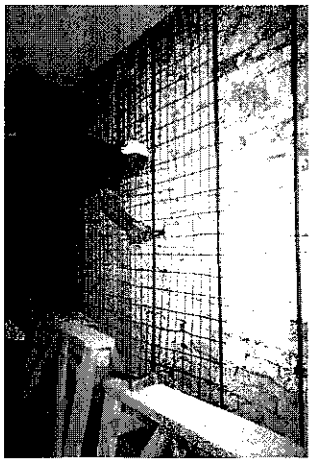
Depending on level of seismic safety of buildings about 10 % should be demolished, part should be reinforced. Instead of demolished buildings new construction should be provided.

New schools buildings should be built with a protection level that guarantees that they remain functional after maximum probable earthquakes.

For every mentioned above type of constructive materials were developed methods of antiseismic reinforcement and implemented in cities and villages of Uzbekistan. Fragments of practical reinforcement presented in following slides.

Reinforcement of columns and foundation of RC frame building



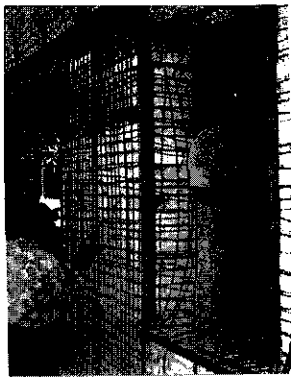


Reinforcement of brick walls

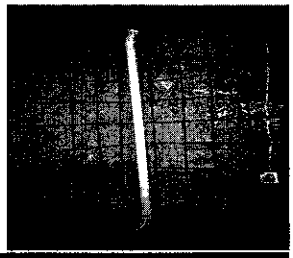
Reinforcement of foundations

Reinforcement of masonry school building

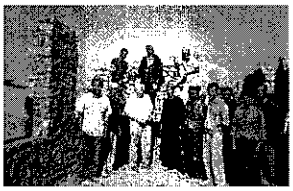
Reinforcement of masonry silica brick school building



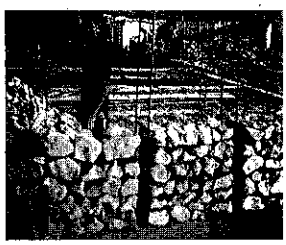
Reinforcement of buildings from saman brick blocks

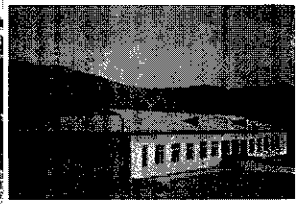


Authors of technical solutions explaining to local builders drawings of stone school buildings reinforcement in Dekhkanabad district, Uzbekistan



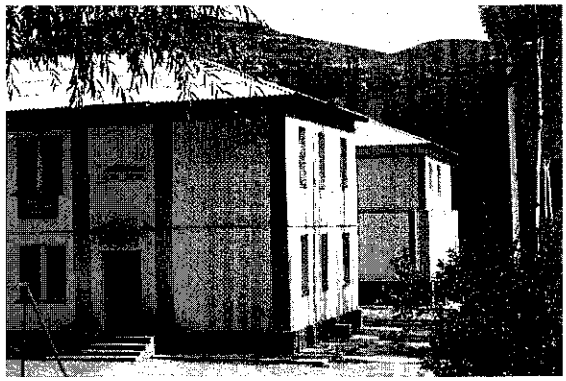
Process of construction of earthquake resistant school building from stone and views of finished buildings



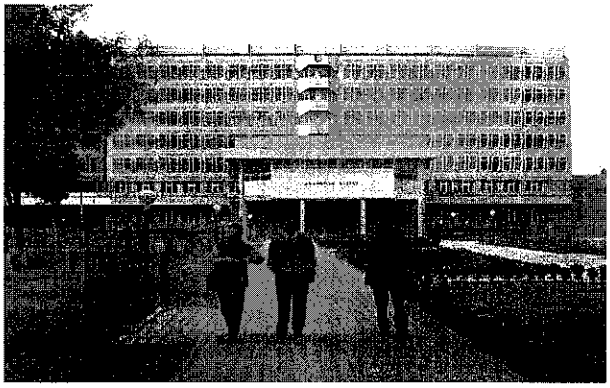


Reinforced school building from adobe brick in Tashkent

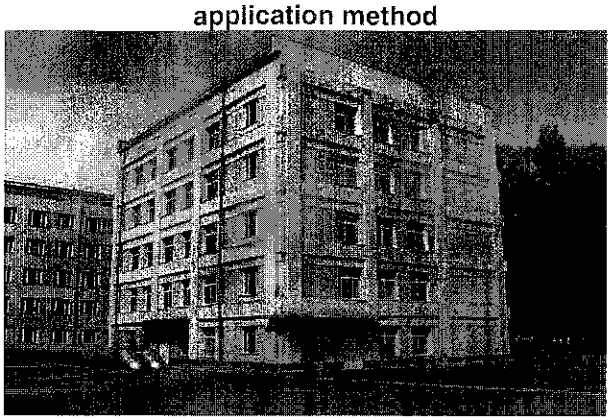
Reinforced stone school building in south Uzbekistan



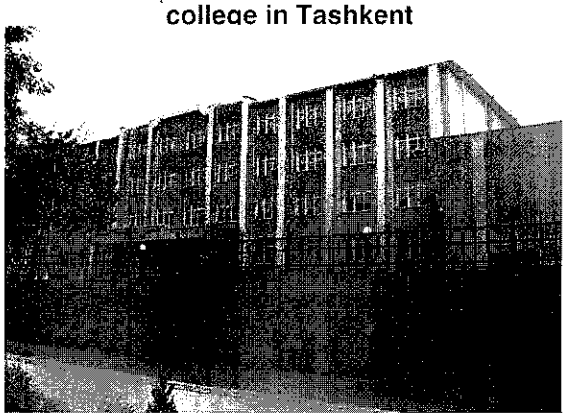
Reinforced RC frame panel building of litceum in Tashkent



Reinforced brick building by application method



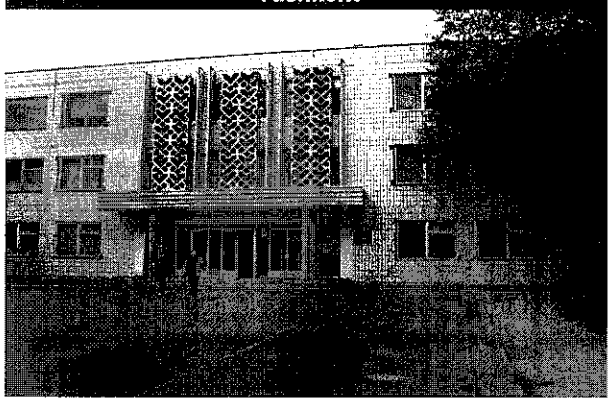
Reinforced brick building of college in Tashkent

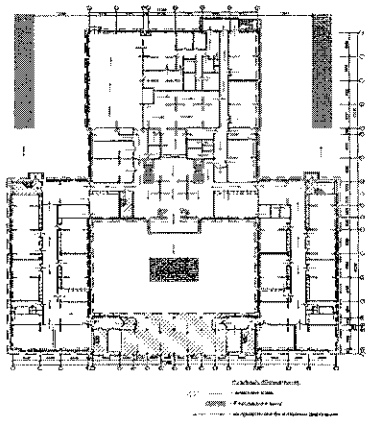


Special training programs for children about living more safely with the natural hazards around them, as part of their basic lifeskills education, including their behaviour before earthquake, during and after it, and their understanding of seismic hazard and mitigation of risk have been undertaken.

For most typical school building types – RC frame panel and masonry were developed planes with pointed out safety places in case of earthquake

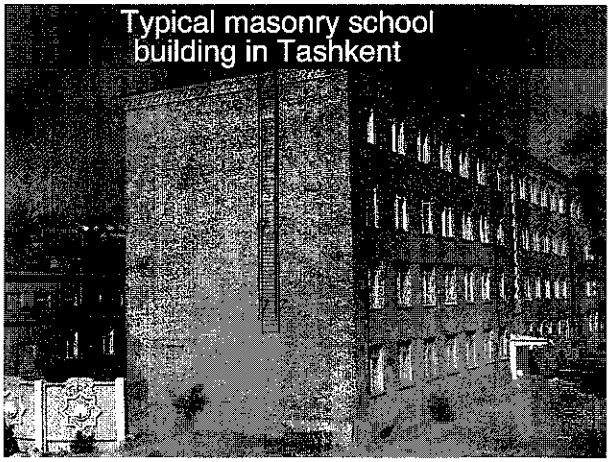
Typical frame-panel school building in Tashkent



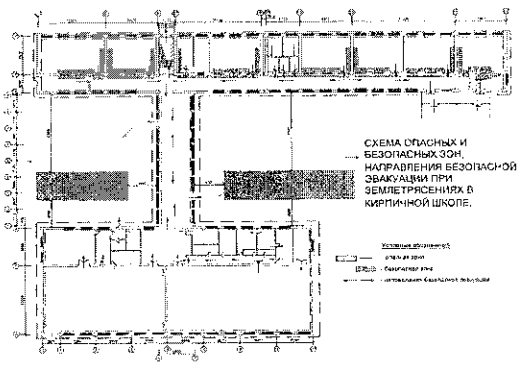


Showed dangerous and safe places and evacuation routes

Typical masonry school building in Tashkent



Showed dangerous and safe places and evacuation routes



Fragments of trainings in schools of Tashkent

We are preparing for the earthquakes – said the children

Group Discussions
"School Earthquake Safety" towards Action

Theme 1: School Safety and Public Policy

Theme 2: Seismic Assessment and School Retrofitting

Theme 3. Disaster Education, Awareness and Training

1. School safety and public policy

Issues

Policy document

- Is there a need for policy of national government for seismic retrofitting/reconstruction of school building? If yes, what sort of policy field should address the issue?
  - Periodic plan for national development
  - National policy for disaster management
  - Separate policy paper in combination with above

Resource/ Funding

- How can seismic safety get the fund from national government? Should the fund for school safety come from education budget or capital budget for safety of infrastructure? Should it come from regular annual budget for development and maintenance of school buildings or should there be separate allocation in budget?
- What is the most appropriate strategy to get funding from donor agencies for school safety?
- How can policy accommodate the issue of vulnerability of both community and private schools?

Institutional set up and process

- Need to establish central body to look after the problem? What should be composition of that body ? What steps should be proceeded for national school retrofitting program? – Assessment/ prioritization/ research/ intervention etc.
- How can technical resource from academic and professional bodies be pulled for this purpose?
- Should be there any progress indicator in school safety in line with Hyogo Framework for Action ?

Approach on school retrofitting process

- Should the local school retrofitting be handed over to school management committee in a participatory approach? What should be the role of local government?

Outcomes presented by Group I on School Safety and Public Policy

1) There is need for a national policy and act on disaster. Risk reduction with special focus on school safety.
2) Appropriate amendments should be effective in the laws/acts etc by which schools are established and governed.
3) There is a need for adequate state budget for retrofitting and maintenance, in countries where there is financial constraint donors should be mobilized.
4) A system of third party safety, audit and certification should be put in place for private schools.
5) Keeping the Hyogo framework long term vision and road map should be worked on with a time bound schedule, targets and monitoring indicators.
6) All new schools should be constructed to seismic safety norms in in accordance with building codes and existing school should be retrofitted in a phased manner , priority should be high risk schools.
7) Actual retrofitting can be done by government or through private agencies but communities should be involved to create a sense of ownership and this will also have a demonstration effect.
8) Creation of a national level institution as a model agency with experts can help school safety. The education department is so loaded with syllables, exams admissions and the routine work , however this should be based on the specific need and mandate of education ministry.
9) International donors and UN which is ready for huge relief after disaster should separate some funds for disaster mitigation and school safety should be one of the priority areas.
10) The engineers who design the building should also be responsible for the safety of the buildings.
11) If existing laws/acts are implemented properly there is no point in creating more policies and acts.
12) Need to create awareness in the societies particularly parent so that they will ask the question whether their children are going to safe schools?

2. Technology for seismic assessment and retrofitting of school buildings

Issues

Process methodology

- What approach should be adopted for assessment/design of existing school buildings?
  A proposal for discussion:
  - Simple assessment of all schools with participation of school teachers (questionnaire based survey?)
  - Prioritization and categorization based on the survey result – safe, not adequate, vulnerable, highly vulnerable etc
  - Technical preliminary assessment of those building under priority for intervention
  - Detail seismic analysis/design
  - School retrofitting/ reconstruction

Appropriate technology

- Should it be a single design template for all schools for retrofitting and reconstruction?
- How can local material and construction method be incorporated?
- What is the possibility that the school retrofitting/ reconstruction can serve model for house retrofitting?
- What is the extent that the cost effectiveness and safety of school building meet each other?

Technical capacity building

- Is there specific need to develop technical manpower for assessment and design of educational buildings?
- Is there need for separate standard for design of school buildings (apart from national building code)?

Mason training

- Can school retrofitting be combined with mason training?

Group II on Seismic Assessment and School Retrofitting

Process Methodology

- Pre-earthquake assessment :
  - ? building-code based small tool for assessing building vulnerability/capacity, for each type of building, for use by professional
  - ? Two step method : 1st step - simplified questionnaire form to be filled by layman (head master/ teachers) for pre-selection of vulnerable buildings, based on type of construction and material, and 2nd step – technical assessment for screening
  - ? Need of training for simple screening process by non-engineers
  - ? Role of technical people for fact analysis and convincing the community during decision process (to demolish/ retrofit/strengthen/do nothing)
  - ? Seismic analysis for prototypes and complex building forms

- Post-earthquake assessment :
  - ? local people may assess building safety based on published (in media) simplified method for assessment and for retrofitting/strengthening

- Need of government policy and strategy (action plan) for numbers of safer school in the future, with a basket of funding from various parties

Appropriate Technology

- Possible use of design templates for typical prototypes for school buildings, with different technology and materials (wooden/bamboo, adobe, brick masonry, RC frame, panel etc…)
- Standardization of school buildings (it has to be realistic and local conditions should be identified for adjustment, should be agreed at policy level, national and international)
- School retrofitting technique can be adopted for house retrofitting
- Encourage involving local people in construction of public schools, to disseminate the technology locally

Technical Capacity Building

3. Education, awareness and training

Issues

Earthquake disaster education in school

- Should be there earthquake education in curriculum? How can this compete with other emerging issues like environment, population, IT etc? Where should it be located in primary and middle level school curricula ?- science, geography, moral science
- How to utilize existing resource on disaster education for school students (public awareness material usually does not reach to school children)?
- What kind of extra curricular activities do support the earthquake disaster education?

For discussion purpose, some example:

- Risk Land game
- Building for Big One exercise
- educational shaketable test
- earthquake drill
- participatory non-structural fixing
- quiz contest, play, painting etc
- school earthquake safety club

Public awareness

- (What should be the strategy for generating demand from parents on need of school safety – case of British Colombia)
- How can school retrofitting program be utilized to generate public awareness on safety?
- Need for regular public briefing on retrofitting process

Teacher/ student training

- How to prepare the school earthquake preparedness plan?
- What kind of monitoring system is appropriate to check the implementation of plan?
- What should be the scope for teacher's training- emergency response/ volunteering etc? Can it go for mitigation and preparedness

authority

- Certification of school building safety
- Mobilize donors for capacity building in school safety through awareness programs

Mason Training

- Mason training is very important for school retrofitting program
- Certification for masons
- Unsolved issue : how to implement mason training within public school projects (budgeted post, whose responsibility?)
- Retrofitting skills should be given only to working masons with basic skills

Group III on Disaster education, awareness and training

1) All hazard approach has to be included at all levels in school
2) The earlier we teach the subject to students the better it is
3) We need to focus on implementation and up scaling. There is enough material available
4) New activities in extra curricular can be promoted mostly simulation exercise, experience sharing by victims
5) Teachers should be given training in all aspects of disaster management, not just preparedness and response.
6) We as disaster managers are measured by people by how we respond when disaster strikes.

Field Trip

Report

On the second day, the workshop participants visited 2 schools in outer fringe of Kathmandu recently retrofitted by communities with help from NSET. The visit provided an opportunity for participants to interact with community people, students, teachers, parents, community people and local governments involved in the retrofitting process. The replication of the earthquake technology adopted in schools for private residential houses surrounding the schools was also observed during the visit.

School Safety Program by NSET

The results of the School Vulnerability Survey on 695 school buildings (within the Kathmandu Valley) showed that 66% of buildings surveyed would collapse if subjected to Intensity IX shaking on the Medvedev-Sponheuer Karnik Intensity Scale. This translates to more than 400 school buildings. There is an urgent need to improve the situation. We have embarked on retrofitting or reconstructing school buildings with earthquake-resistant features. Schools are selected based on their vulnerability and other factors such as community interest. In most cases, retrofitting is the preferred measure as it is less costly.

Earthquake awareness seminars and workshops are held concurrently with the retrofitting or reconstruction works. Seminars and workshops are conducted for district education officials, school committees, principals and teachers, parents and students, and the local community at large. Other activities such as drawing up of emergency plans and holding emergency drills are also conducted.

Throughout the whole process, we insist on involving the communities, as it is our belief that genuine and long term improvement can only take place if the local communities take ownership of the problems and solutions. They raise part or full building costs; the local masons work alongside and receive on-the-job training on earthquake-resistant construction from NSET fs engineers and masons.

To date, nine schools have been retrofitted or reconstructed, and in four schools works are in progress. The cost of reconstructing a two-storey school building is about US $12,000, and it takes about 4 months. It is highly crucial that affordable and replicable methods of retrofitting or reconstruction be developed in order to speed up the mitigating process.

This is one of the initiatives from the Kathmandu Valley Earthquake Risk Management Action Plan. Its objectives are:

1. To assess the vulnerability of public school buildings
2. To identify and implement measures to reduce the vulnerability
3. To raise awareness of earthquake risks and preparedness

Salient Features of NSET's SESP Program Activities

NATESHWORI PRIMARY SCHOOL

Location: Located at Chhaling V.D.C-1, Pikhel, Bhaktapur
17km from Kathmandu

Population: About 750 people are living in 4 villages of the school. Surrounding area. They are of different ethnicity.

School Status: This school is one of the towo primary schools in the ward
School was established in 2017 B.S
Classes I to V
Public School (however, government fund is only for salary of teachers and some station ary)
Zero budget from the government for construction and maintenence

No of Students: 69

No of Teachers: 4 provided by government, 2 privately managed by SMC

Physical Facility earlier the initial buiding was highly vulnerable made in brick in mud 2 story with G.I.Sheet roofing on the land provided by local authority

Buidling Condigion: New construction is in cement sand mortar, 2 story and 8 rooms with seismic resistant elements

Reconstruction of the school buiding: The school buidling construciton is started 23 March 2002. The proposed School building is wiht Earthquake Resistant elemtns, 2 story brick in cement with 4 rooms in each floor. The estimated cost was NRs. 1272143.63

Reconstruction Cost: 1263184.05

Results Achieved: Reduced Vulnerablity of the School Building
School Children and teachers are safe from earhtquake
School can be used as temporoary shelter or health post in post earthquake emergency situation
Local Masons are trained and they can work effectively on other projects
Level of awareness on earthquake safety is raising in the community
Replication of Technology is already started on the local construction and in past two years more than 8 buidlings in teh community were constructed using the earthquake resistance technology
Library is set up with the help from Room to Read
Toilets are constructed

Problems: Available fund is not sufficient for the completion of two florrs fund to be managed.

Salient Features of NSET's SESP Program Activities

Bhuwaneshwori Lower Secondary School

Location: Located at nangkhel Village Development Committee of Bhaktapur district
The VDC is located at eastern part of Kathmandu
Distance from Kathmandu is about 15 km, 2.7 km fair weather eathern road

Population: About 1200 people were involved in the retrofitting process
most of the people are of Newar ethnicity with occupation - mostly masons and agriculture
The chairman of school management committee is a mason

Education Status: Education status are very poor

School Status: Lower Secondary School
Classes are running up to 8 classes
School established on 1961
Buildiing constructed on 1965
Retrofitted on 2000
Reconstructed in 2001

No of Students: 195

No of Teachers: 9

Physical Facility earlier with 2 rooms: The school has 2 blocks, one 2 story with 8 rooms building and another single story

9 rooms are used for classrooms
1 room is used for office

Buidling Condigion: Originally, the first block of school was single story 4 rooms brick masonry building made in mud mortar
Later, it was expanded to double story with 8 rooms in 1978
the second block was also of brick masonry in mud mortar and construction history same to first one
The first block was retrofitted and the second one was reconstructed

Reconstruction of the school buiding: The first block was retrofitted in 1999 and second was reconstructed in 2000

provision for outside opening of doors
prvision of stitches, splints and bandages
changing of flexible roof to rigid in retrofitting
other refurbishing items
community participation is very high

Reconstruction Cost: 550817

Results Achieved: The secont block was recontructed by the community with earthquake resistance elemtns after retrofitting of the 1st block, initially one floor and then one floor was added in 2004 by the community initiatives.

Involvement of local industries and community was wonderful

Reduced vulnerability of the school building

- school chilren and teachers are safe from earthquake
- school can be used as temporary shelter or health post in post earthquake emergency situation

Local masons are trained in the community and they are working efficiently on our school earthquake safety programme

Level of awareness on earthquake safety is raised in the community

Initial Library is setup with the help of room to read

Replication of technology on the community is visible

Demand of trained mason is high and masons are making safer buildings in efficient way

Problems: After retrofitting the number of children are increased but due to lack of classrooms they can not accomodate all children

The upper class in this school is limited to class 8. So to continue the education in class nice the school children should go to next higher school, which is very far. So the number of children discontinue their school may increase

Appendicies

Workshop Program
Participants List
Photoes

PROGRAM (Day 1)

9:15 - 10:15 INAUGURAL SESSION

Chair: *Mr. S. B. Pradhanang*, President, NSET-Nepal

Welcome Speech — *Mr. Amod Dixit*, Executive Director, NSET-Nepal

Opening Remarks — *Mr. Kazunobu Onogawa*, Director, United Nations Centre for Regional Development (UNCRD)

Message — *Prof. Dr. Mangal Siddhi Manandhar*, Honorable Minister of Education and Sports, Government of Nepal

Message — *Dr. Salvano Briceno*, Director, UN Secretariat for International Strategy for Disaster Reduction (UN ISDR)

Inaugural Speech — *Mr. Ram Sarobar Dubey*, Acting Secretary, Ministry of Education and Sports, Government of Nepal

10:15 - 11:15 BREAK

10:45 - 12:30 WORKSHOP THEME PRESENTATION "Keeping Schools Safe From Earthquake"

Chair: *Dr. Kenji Okazaki*, Professor, GRIPS, Japan

"School earthquake safety and national policy: making the case for safe schools"
Mr. Bishnu Pandey, Researcher, UNCRD

"Seismic retrofitting of school buildings"
Prof. Ravi Sinha, Professor, IIT Bombay, India

"Nepal's efforts towards environment friendly and disaster-safer schools"
Mr. Shambhu Prasad Uprety, Deputy Director, Department of Education, Government of Nepal

"Condition Assessment and Seismic Retrofitting of Masonry Buildings"
Prof. A.S. Arya, Seismic Advisor, Government of India

"School Earthquake Safety during Post Disaster Reconstruction"
Mr. V. Thiruppugazh, Joint CEO, Gujarat State Disaster Management Authority (GSDMA), India

12:30 - 13:30 BREAK

13:30 - 15:45 CASE STUDY PRESENTATION "Aseesing the Ongoing Initiatives"

Chair: Mr. Amod Dixit, Executive Director, NSET

"Need and Prospect of Incorporating Disaster Education into School Curricula"

Mr. Koichi Shiwaku
Kyoto University, Japan

"CBDM through School Safety"

Mr. Mahesh Nakarmi
Project manager, NSET, Nepal

"Saving Our Future: Assessing the Ongoing Initiatives on School Safety in Fiji"

Mr. Joeli Rokovada
Director, National Disaster Management Office (NDMO), Fiji

"School Earthquake Vulnerability Reduction in Indonesia"

Dr. Krishna Pribadi
Institute of Technology Bangdung (ITB), Indonesia

" School Safety Initiatives in India"

Mr. Manu Gupta
Co-Director, SEEDS, India

"Earthquake Safety of School Children in Uzbekistan"

Dr. Samil Khakimov
Head of Design Department, UzLITTI, Uzbekistan
Dr. Khusan Tursonov
HAYOT, Uzbekistan

15:45 - 16:15 BREAK

16:15-17:45 Parallel Group Discussion: School Earthquake Safety (SES) – Towards Action

Group I- Theme: School Safety and Public Policy

Coordination by *Mr. V. Thiruppugazh*

Group II- Theme: Seismic Assessment and School Retrofitting

Coordination by *Dr. Krishna Pribadi*

Group III- Theme: Disaster education, awareness and training

Coordination by *Mr. Joeli Rokovada*

PROGRAM (Day 2)

8:30 -13:00 Field Visit to seismically retrofitted schools in Kathmandu

Coordinator: *Mr. Ram Chandra Kandel,* NSET-Nepal

Field visit and meetings with communities in Bhuwaneshwory School, Nangkhel
Field visit and meetings with communities in Natyashwori School, Chhaling

13:00 - 14:00 BREAK

14:00-16:30 Plenary Session: Commitment for future

Chair: *Mr. Laba Prasad Tripathi*
Joint Secretary, Ministry of Education and Sports, Government. of Nepal

Presentation of Group discussion results by coordinators
Proposal for workshop resolution

Mr. Bishnu Pandey
Researcher, UNCRD

Discussion on Workshop resolution and its adoption

Coordination by *Mr. Amod Dixit*
Executive Director, NSET-Nepal

16:30- 17:00 Concluding Session

Chair: Mr. Kazunobu Onogawa, Director, UNCRD

Vote of Thanks

Mr. Amod Dixit
Executive Director, NSET-Nepal

Concluding Remarks

Mr. Kazunobu Onogawa
Director, UNCRD

Participants List

Photos

安心できる学校、住まい、地域づくりを目指して
防災シンポジウム２００６
シンポジウムⅠ 報告書
「子供たちへ：地震に強い学校と防災教育」
２００６年５月

発行　：　国際連合地域開発センター防災計画兵庫事務所
編集　：　安藤　尚
　　ビスヌ・パンディ
　　藤枝　絢子
編集補助　：　石本　ゆか