

**Educational materials for School Earthquake Safety
from Guidelines to Practices**

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SECTION I: INTRODUCTION

REDUCING VULNERABILITY OF SCHOOL CHILDREN

1. Introduction

UNCRD is implementing a project on “Reducing Vulnerability of School Children to Earthquakes” in Asia-Pacific region under project execution by UN Department of Economic and Social Affairs (UN-DESA) and funded by UN Trust Fund for Human Security (UNTFHS) of UN OCHA since April 2005.

The project aims to ensure that school children living in seismic regions have earthquake resilient schools and that local communities build capacities to cope with earthquake disasters. The project includes retrofitting of some school buildings in a participatory way with the involvement of local communities, local governments and resource institutions, trainings on safer construction practices to technicians, and disaster education in school and communities. These activities are carried out in Fiji Islands, India, Indonesia and Uzbekistan as demonstration cases which are being disseminated throughout the respective geographical regions through regional and international workshops.

1.1. Approach of SESI

This project focuses on (1) developing and transferring earthquake-protective technology to school buildings, (2) promoting education related to earthquake disasters. The first is physical and concerned with transferring earthquake-safer construction technology to the community, while the second provides education to students, teachers, and communities on disaster preparedness in order to raise awareness and self-reliant capacities. An additional purpose of the project is to ensure that the outputs of the project are also made available to other countries that experience similar natural disasters. The schools can be used as relief and rehabilitation shelters after earthquakes. Moreover, the strong leadership of teachers has been proven to be very effective in dealing with emergency situations in disaster-prone countries such as Japan. Schools play a crucial role in community training and building social capital among various community groups. Moreover, by raising awareness among children, the message can reach their families, and a culture of mitigation can be spread through the community.

The project facilitates the on-site implementation of training and capacity-building program for earthquake disaster mitigation, ensures the safety of school children, reduces damage caused by earthquakes, and thus leads to sustainable development. Promotion of sustainable development is in accordance with the overall goal of UN DESA and the mandate of UNCRD. The aims of the project are fully consistent with the commitments of the World Summit for Social Development (Copenhagen, 1995) and the World Summit on Sustainable Development (Johannesburg, 2002). These objectives are echoed in the UN Millennium Development Goals (MDGs), especially the ones dealing with poverty reduction.

1.2. Goal and Objectives

The goal of the project is to ensure that future generations living in seismically vulnerable areas have access to earthquake-resilient schools, and that local communities build the necessary capacities, through education and training, to cope with earthquake disasters.

The goal is achieved by demonstrating how schools can be used as community centers for earthquake disaster prevention and mitigation. This includes physical retrofitting of the

schools, training of the local communities, and preparation and dissemination of educational materials on earthquake disasters. Locally applicable and affordable earthquake-safer construction technology is being transferred to these communities. This contributes towards the creation of earthquake-resilient communities, thereby enhancing their human security.

1.2.1. Objectives

- To achieve the above-mentioned goal, the objectives of this project are as follows:
- To assess seismic vulnerability and enhance seismic safety by retrofitting selected schools as model cases;
- To demonstrate earthquake-safer construction practices, and enhance the capacity of masons and engineers;
- To raise awareness among students and communities through disaster education, and
- To disseminate case study experiences widely throughout the target countries and their respective regions.

2. Four Major Activities

2.1. Objective 1:

Assess seismic vulnerability and enhance seismic safety by retrofitting schools as model demonstration cases

This includes selection of around 10 schools in each case study city, seismic analysis of the selected schools, design of retrofit recommendations, and the retrofitting of 10 model schools (two in Tashkent and Bandung and three each in Suva and Shimla). This produced retrofit guidelines and manuals, which can be applicable to the regions. One national consultant (with a civil engineering background) conducted the seismic analysis and the retrofit design with the help of an international consultant.

2.2. Objective 2:

Demonstrate earthquake-safer construction practices, and enhance the capacity of masons and engineers. The aim is to provide earthquake-safer construction practices to the communities through local training programs. Schools are used as the models for demonstrating the retrofitting technology. Training manuals have been developed targeting the masons and engineers. One training specialist was employed as a national consultant in each city.

2.3. Objective 3:

Raise awareness of students and communities through disaster education

Educational materials have been developed, and used for training and awareness-raising programs. The educational materials consist of booklets and posters for the schoolchildren, and a CD-Rom. The CD-Rom contains general information on earthquake and educational software for risk assessment of houses and communities. One international consultant was employed for the development of the educational software. Two national consultants were employed, one as an education specialist, and the other as a communication specialist.

2.4. Objective 4:

Disseminate the case study experiences widely throughout the target countries and their respective regions

National and regional training programs were conducted, involving the representatives of each region. An international workshop has been arranged to disseminate the experience globally. The results are being published.

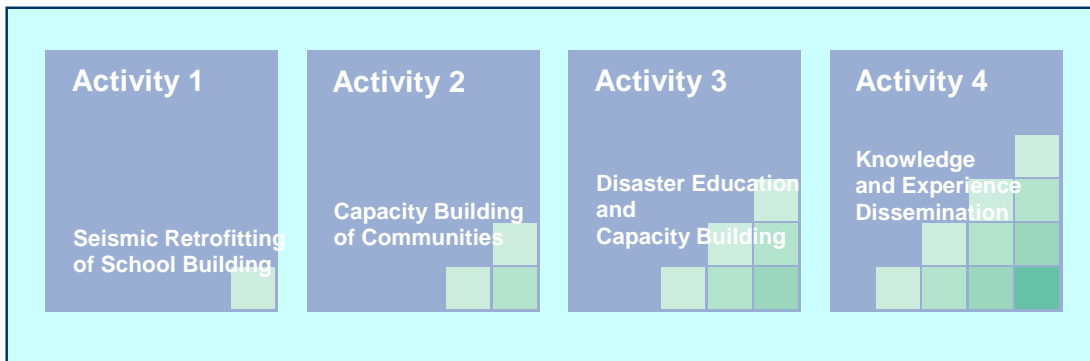


Figure 1: Activities of Reducing Vulnerability of School Children to Earthquakes

3. Outcomes and Outputs

Overall, a national consultant was appointed as a project manager. On-site field inspection and monitoring was carried out by UNCRD. An independent evaluation is being made at the end of the project by an international consultant. The activities in support of the program are:

- Appointment of a national consultant in each city (project manager) by UNCRD
- Appointment of one locally-recruited individual (project assistant) to be stationed at UNCRD in Japan
- Monitoring missions during the training programs by UNCRD staff
- Preparation of periodic progress reports and six-monthly reports by the national consultant
- Appointment of an international consultant (project evaluation)

3.1. Complementary Project Outputs

In addition to the schools retrofitted with safer construction technology, trained masons and engineers, and educated children and communities, the following materials were produced.

At the city level:

1. Guidelines for selection of vulnerable schools
2. Retrofit manuals
3. Educational booklets
4. Educational posters
5. Final report of each city

At the national and regional level:

1. Proceedings of the national and regional workshops

At the international level:

1. Proceedings of the international workshop
2. Final Report with CD-Rom, which includes:
 - a. The final reports from each city,
 - b. Retrofit manuals
 - c. Educational booklets and posters (produced in each city), and educational software
3. Reproduction of educational software in different languages

4. Implementation Modality

The project has been executed by the United Nations Department of Economic and Social Affairs (UNDESA). UNDESA is responsible for the financial administration and overall direction of the project. UNCRD Hyogo Office implemented the project. It coordinates all projects activities, and has been responsible for monitoring and contacts with local counterparts. The counterparts for the case studies have been the local governments, which own and operate the public schools. A local committee has been formed in each city to carry out the project in the country.

UNCRD has appointed three national consultants in each country: one project manager, one civil engineer (for retrofitting), one training, education, and/or communication specialist. These three national consultants has been a part of the project team, and are responsible for conducting the project activities in each country. Retrofitting of schools has been carried out by the local counterpart, in close cooperation with the local committee and the project team. The fund for retrofitting has been provided from the project budget through a contract to the local counterpart. The project scope, activities, and cost estimates were formulated through consultations with the local governments. International consultants have been appointed by UNDESA/UNCRD for: 1 review seismic retrofitting, 2 development of educational software, and 3 independent evaluation of implementation of the project.

5. Beneficiaries of the project

The beneficiaries of the project are primarily school children studying at the schools targeted for retrofitting. Since the average life period of a retrofitted building is 25 to 30 years, beneficiaries also include the students of the retrofitted schools for the next 25 - 30 years. The immediate beneficiaries from training for earthquake-resistant design and construction include masons and technicians in the cities of project implementation. From the activities related to disaster education and schools safety plan, teachers are also benefited. The beneficiaries include community people in project cities as the disseminations of technology and community seminars are to building their capacity to manage the earthquake risk. Institutionalization of the school earthquake safety will benefit local and national governments which are supposed to upscale the activities with the community based approach. At the regional level, training workshops are planned to involve experts and government officers in the related field. This ultimately benefits those countries for seismic risk management with particular focus on school earthquake safety.

SECTION II: GUIDELINES

Educational Materials from Fiji

Three educational materials, “Teacher’s Handbook for Disaster Management and Earthquake Preparedness”, “Students’ Workbook on Disaster Management”, and “A Guide, To Creating Evacuation Plans for Schools in the Fiji Islands” has been developed by the educational experts of this project in collaboration with NDMO and Ministry of Education. The workbooks were reviewed at the National review workshop on school safety book in December 2007.



Figure 2: Educational materials in Fiji

1. A Teacher’s Guide

This section is a guide for teachers when working with a class on Disaster Management exercises and drills. It is divided into three subsections:

- Teacher’s preparation,
- Working with Students,
- Other Activities to be considered

Your preparations for the various subsections are important so that your students will be interested and will participate fully in all activities.

1.1. Teacher’s Preparation

- Ensure you have a copy of the Students’ Disaster Management Workbook, as well as a copy of the School Evacuation Handbook. Read these books thoroughly and make sure that you are familiar with the drills as well as how to evacuate your classroom and the school.
- Ensure there are enough copies of the National Disaster Management Unit (NDMU) disaster preparation handouts, and copies of the SOPAC Pacific Hazards fact sheets. (A set is attached as Appendix to this book, and another set is included in the children’s workbook.)
- Seek support from SOPAC and NDMO to help your students when they are doing their research on disasters.

- Ensure there is contact (or maintain contact) between your school and NDMU, so that you are able to send the students' essays in time for judging during the Unit's "Disaster Awareness Week".
- Work with the Principal or Head Teacher on a time for drama or skit performances by your students to the whole school. (NDMU may be interested in the drama or skit, and have it performed during "Disaster Awareness Week" at a centre near your school).
- Work with the Principal and the school's OHS Officer to practice drills at least three times every term, not only for your class but for the entire school.
- Cut out some newspaper stories on disasters to put up on the "disaster corner".

1.2. Working with Students

1.2.1. Classroom Activities & Exercises on Disasters

A. A "Disaster Corner"

- Choose a wall or have a board up in your classroom, which your students can use as a "Disaster Corner", to put emergency directions on.
- It is also where you and the students put up posters, and post explanations of different types of disaster that happen in Fiji.
- Make sure newspaper stories about disasters are cut out and posted on the board.
- Encourage the students to think of other ways of using the "disaster corner"

B. Group Work

- Give clear directions to the students about working in groups to discuss and answer questions posed in their workbook. Each group should choose a leader and a writer, and also choose one person to present their findings.
- Ensure each group has enough newsprint and pens.
- Give the children enough time to work. You can assign the groups to undertake research in the school library, at the city or town library (if any), at NDMO Office, or at SOPAC Office.
- Be there for them when they need you to answer questions they may find difficult.
- Facilitate the work groups' presentations, and make sure there is a good understanding of each topic.
- Once all groups have presented, collect the newsprint pieces and ensure all their work is typed up ready for posting at the "Disaster Corner".
- The first part of the students' discussions centers on the school's emergency kit or kits. If there are no kits in the school, help the children think up and write out one. This is then presented to the Principal and other teachers for discussion, adaptation and adoption.
- Disasters or emergency situations that your students have to do research on include earthquakes, cyclones, floods, landslides, tsunamis and fires.

1.2.2. *Other Classroom Activities*

A. Essay writing

- Ensure the students choose different topics to write on, and that they research it as thoroughly as possible before writing.
- If there is a computer lab in the school, ensure your students will have access to these.
- Ensure there is contact with NDMO Office and that the best essay (on each topic) is submitted well before closing date

B. Drama or Skit

- Ask the students to work in groups to produce a drama or skit on a disaster topic of their choice.
- Give them time to work, prepare and submit their work.
- Read each drama or skit through and edit it before getting the group to rehearse and perform it to their classmates.
- Chose the best one and ask the Principal/Head Teacher for a time for your students to perform in front of the school.

C. Poems, Chants, Songs and Meke

- Ask your students to write a poem about preparations for a hurricane (or another type of disaster), or a poem about happenings during a disaster, or one on cleaning up.
- Help them to become more creative and create a chant, a song or a meke about any of the disasters. Give them existing chants, songs and meke which you can use as models.

D. Drills

- All drills must be practiced at regular intervals during the school year, so that all children and teachers will automatically respond whenever a disaster occurs in school.
- A copy of the School Fire Drill should be on the Classroom Notice Board.
- All students must know their escape route in case of fire or earthquake occurring during school hours.
- All teachers must take their class attendance register whenever a drill is carried out, and when a disaster occurs.
- Read the drills thoroughly so that you are comfortable with giving your students the right directions.
- Prepare your students to be familiar with and to perform the earthquake, fire and evacuation drills.
- Discuss the drills with the Principal or Head Teacher as well as with other teachers, and make time for demonstrations to be carried out by all teachers and students. Drills should be done at least three times every term.
- Seek the permission of your Head Teacher or Principal to invite the National Fire Authority to your school to demonstrate their work and to assist students to do the fire drill as well as the evacuation drill.
- The Fiji Red Cross Society is always ready to send a representative to schools to discuss disaster and evacuation programs.

- If there is no evacuation plan for the school, initiate discussions on the subject with other teachers and the Head Teacher or Principal, share the evacuation plan handbook with them, and also with the School Management.

1.2.3. *Other Activities*

Classroom activities that relate the disaster to course study can be a good way to help the students integrate their own experience or observations while providing specific learning experiences. In implementing the following suggestions, or similar ideas of your own, it is very important to allow time for the students to discuss feelings that are stimulated by the projects or issues covered.

- Journalism—Have the students write stories that cover different aspects of the disaster. These might include community impact, lawsuits that result from the disaster, human interest stories from fellow students, geological impact, etc. Issues such as accurate reporting of catastrophic events as sensationalism might be discussed. The stories might be compiled into a special student publication.
- Science—Cover scientific aspects of the disaster, e.g., discuss climate condition, geological impact, etc. Project about stress: physiological responses to stress and methods of dealing with it. Discuss how flocks of birds, herds of animals, etc., band together and work in a threatening or emergency situation. What can be learned from their instinctive actions?
- Psychology—Have the students apply what they have learned in the course to the emotions, behaviors, and stress reactions they felt or observed in the disaster. Cover post-traumatic stress syndrome. Have a guest speaker from the mental health professions involved in disaster work with victims, etc. Have students discuss (from their own experience) what things have been most helpful in dealing with disaster related stress. Have students develop a mental health education brochure discussing emotional/behavioral reactions to disaster and things that are helpful in coping with disaster-related stress. Have students conduct a survey among their parents or friends: What was the most dangerous situation in which you ever found yourself? How did you react psychologically?
- Peer- counseling—Provide special information on common responses to disaster; encourage the students' helping each other integrate their own experiences.
- Health— Discuss emotional reactions to disaster, the importance of taking care of one's own emotional and physical well-being, etc. Discuss health implications of the disaster, e.g., water contamination, food that may have gone bad due to lack of refrigeration, and other health precautions and safety measures. Discuss the effects of adrenalin on the body during stress and danger. A guest speaker from Public Health and/or Mental Health might be invited to the class.
- Art—Have the students portray their experiences of the disaster in various art media. This may be done individually or as a group effort (e.g., making a mural).
- Math—Have the class solve mathematical problems related to the impact of the disaster (e.g., build questions around gallons of water lost, cubic feet of earth that moved in a mud slide).
- History—Have students report on natural disasters that have occurred in your community or geographic area and what lessons were learned that can be useful in preparing for future disasters.

- Civics/Government—Study governmental agencies responsible for aid to victims, how they work, how effective they are, and the political implications within a community. Examine the community systems and how the stress of the disaster has affected them. Have students invite a local governmental official to class to discuss disaster precautions, warning systems, etc. Have students contact the NDMO regarding recent disaster-related bills passed or pending. How will this legislation affect your community and other areas of the state? Visit local emergency operating centers and learn about their functions.

2. Earthquake Preparedness

You should consult your school manager about the standards, guidelines, and procedures that are already in place for disasters such as earthquakes, cyclones, floods, landslides, fires, and tsunamis.

You can never tell when there will be an earthquake, but you can take steps to reduce or avoid damage, injuries, or loss of life for the young people in your care, your staff, and yourself.

Preparing for an earthquake includes things you already do to protect the children’s safety and health, such as having a fire extinguisher handy and maintaining your certifications for first aid and CPR. With additional planning and preparation, the young people in your care will have a better chance at surviving an earthquake unharmed.

2.1. What You Can Do Before an Earthquake?

2.1.1. Earthquake-proof building

Make your building more earthquake-proof, include earthquake preparedness in your emergency plans, teach children and staff what to do if an earthquake happens, and keep emergency supplies on hand. In an earthquake, most injuries and deaths are caused by loose objects in and on buildings. During the shaking, cabinets and bookcases topple, objects fall out of cabinets, and hanging or large plants fall. Door frames and window jams may be bent when walls move. Doors may slam or jam shut, and window glass can shatter, sending broken glass into the room. Light fixtures, and other ceiling components may pop out and fall. Objects mounted on the walls (such as clocks, maps, and art work) may shake loose and fly across the room. The electricity may go out, and the fire alarms may turn on.

It’s not the Earth’s shaking itself that causes the most injury and harm. Instead, it’s the things that the earthquake puts into motion: the shaking of buildings, structures, and even ordinary household items. Anything that can move, fall, break, or cause a fire can be an earthquake hazard.

2.1.2. Conduct a “hazard hunt”

Go through your school or facility, room by room, looking for objects or situations that might cause damage or injury. Make an inventory of all items that require attention. Walk the halls and classrooms. Stand in the center of each room and look all around you: imagine which objects or pieces of furniture might fall over or fly through the air.

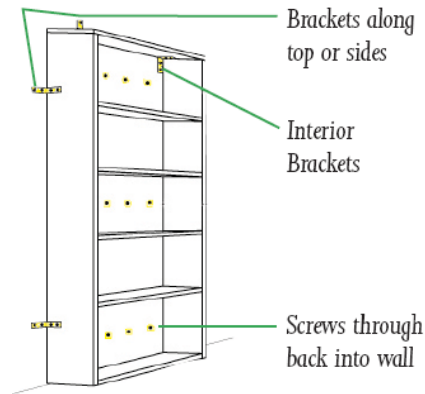


Figure 3: Securing a book case to the wall

2.1.3. Make your facility more earthquake-proof

Remove, move, fasten, or latch items that are likely to break, fall over, cause a fire, or hurt people. Work with the building’s owner or manager and other building tenants if you rent or share space. If you are housed in a school, coordinate with your school administrator or manager.

Secure a bookcase to the wall.

You or the school manager may be able to correct most of these hazards.

- Bolt down and secure to the wall studs: Water- heater, gas, appliances, and refrigerator.
- Move heavy objects to lower shelves: If heavy objects can’t be moved, attach them to the desk or table they are sitting on with a heavy-duty hook-and-loop fastener, such as Velcro. If necessary, add lips to shelves to keep items from sliding off.
- Make sure hallways and exits are clear of objects that might fall and make it difficult to get out of the building.
- Brace overhead light fixtures.
- Install latches on cabinet doors.
- In the Sick Bay or Day-Care Centers, move beds and cribs away from windows, and lock their wheels if possible.
- Move heavy items such as pictures and mirrors away from sleeping and sitting areas.
- Lock wheels on rolling carts, such as a TV cart.

Have a professional help you with the following:

- Bolt the building to the foundation if necessary.
- Wood frame buildings that are bolted to the foundation are less likely to be damaged than those that aren’t. (You can call your local building department to find out when your home or facility was built.)
- Repair any deep cracks in ceilings or foundation.
- Repair or replace defective electrical wiring and leaky gas connections.*
- Replace inflexible utility connections with flexible ones.*
- [* Do not repair gas or electrical lines yourself.]

Know How To Shut Off Electricity, Gas, And Water

You may need to turn off the electricity, gas, or water after an earthquake because of broken or exposed electrical wiring, a gas leak, or flooding from leaking pipes or sprinklers. Locate the gas and water “shut-off” valves and master electrical switch. Learn how to turn these off and train your staff to do so. Make sure you have a crescent or pipe wrench near the gas and water valves and in your emergency supplies.

Prepare an emergency kit

After a large earthquake, you may be on your own with the children for two or three days. In addition to the safety equipment you already have on hand such as a fire extinguisher, you need an emergency kit. This kit should include: Flashlight with extra bulbs and extra batteries.

- Portable battery-operated radio and extra batteries
- First aid kit and manual
- Roster of children with addresses and their parents’ emergency contact information
- Crescent and pipe wrenches to turn off gas and water supplies
- Emergency food and water: Water—A supply of bottled water and cups (one gallon per person per day). Store water in sealed, unbreakable containers (for example, plastic). Identify the storage date and replace every month. Include purification tablets or chlorine bleach in your kit to purify drinking water from other sources. Food—A supply of non-perishable packaged or canned food.
- Waterproof plastic bags (for protection from rain, ground cloths, removal of waste, etc.)
- Non-electric can opener
- Essential medicines and medical supplies
- Diapers and wipes
- Blankets
- Work gloves
- Sturdy boots or shoes

Other items in the emergency kit might include:

- Paper and pens, Permanent markers, Games and toys



Figure 4: Emergency Kit

2.1.4. *Have a communication plan for disasters and keep parents informed.*

Parents need to know what you plan to do in an earthquake or any other type of emergency. Develop a plan for reuniting families after an earthquake or any other disaster. Maintain up-to-date rosters of students with contact information for parents and emergency contacts. Encourage parents to identify an out of- state contact for large-scale emergencies like an earthquake. After an earthquake, it may be easier to make out-of-state and long-distance calls as in-state and local calls may be blocked due to emergency calls. Ask parents to make an earthquake plan for their homes and to talk to their children about earthquake safety.

2.1.5. *Conduct Earthquake Drills*

Just as you conduct drills for other types of emergencies (fires or tornadoes), you should conduct earthquake drills several times during the year. (Ask your local office of emergency services or your Red Cross office for a recommendation on how frequently you should conduct earthquake drills in your area.)

Identify A Safe Gathering Place Outside

Find a safe spot outside. This spot should be away from the building, trees, playground structures, fences, utility wires, or anything else that might fall on you. Make this your designated gathering place in case of an earthquake or other disaster. Ensure that all children and staff know where to go if you need to leave the building in an emergency.

When earthquake shaking begins . . .

Drop, Cover, and Hold



Figure 5: Drop cover and hold (Source: FEMA)

Teach The Children To “Drop, Cover, And Hold”

During an earthquake, the most important thing for any child or adult to remember is to Drop, Cover, and Hold.

At the First Sign Of Shaking: Drop to the ground. Take Cover by getting under a sturdy table or other piece of furniture. Hold on until the shaking stops.

Practice Drop, Cover, and Hold in earthquake drills. Drop, Cover, Hold

Tell the children that during an earthquake, the earth might move beneath their feet like a boat in the waves. Explain that earthquakes may be noisy, with loud banging, crashing, or rumbling sounds and ringing alarm bells. Identify the safe places in each room:

- under sturdy furniture like a heavy desk or table
- against an inside wall, away from windows, mirrors, pictures, bookcases, or other heavy objects that might fall.

Spend time explaining the Drop, Cover, and Hold drill and demonstrate what you want them to do. Get the children’s attention and give clear and distinct commands. Speak in a calm voice. At the command of “earthquake,” you and the children should immediately: “Drop, Cover, and Hold”.

Because earthquakes and aftershocks come without warning, practice drop, cover, and hold drills outside, in your play area, and in various parts of your facility. Plan several routes for getting out of the building after an earthquake, and practice evacuation drills regularly.

2.2.What You Can Do During an Earthquake?

2.2.1. At the first sign of shaking

- Drop to the ground
- Take Cover by getting under a sturdy table or other piece of furniture.
- Hold on until the shaking stops.

Sometimes smaller tremors come before or after a larger earthquake. Because we never know until the shaking has stopped which quake is the main event, it is essential to Drop, Cover, and Hold at the first sign of shaking.

If You Are Inside

- Kneel under a desk, table, or bench. If there aren’t enough sturdy pieces of furniture to get under, kneel next to an interior walls but away from windows, overhead light fixtures, and tall pieces of furniture that might fall over.
- Stay under cover until the shaking stops (at least one minute). Face away from windows, and bend your head close to your knees.
- Hold on to the table leg or desk (a few inches above the ground to avoid pinching fingers). Cover your eyes with your other hand. If your “shelter” moves, move with it. If you don’t have a “shelter” to hang on to, clasp your hands on the back of your neck to protect your face.

If You Are Outside

Move into the open, away from buildings, fences, trees, tall playground equipment, utility wires, and street lights.

- Kneel or sit on the ground and cover your head and face with your hands.
- Once in the open, stay there until the shaking stops.
- Don't try to take cover in a doorway during an earthquake. The door may slam on you.
- Don't run during the shaking or use the stairways or elevators. Many people are killed just outside buildings because of falling bricks and other debris.
- Don't turn on the gas again if you have turned it off; let the Gas-company do it.
- Don't use your telephone for the first 90 minutes after an earthquake, except for a medical or fire emergency. You could tie up the lines needed for emergency response.

2.3. What You Can Do After an Earthquake

2.3.1. Is it safe to move?

Once the shaking has stopped, look around for possible hazards to determine if it is safe for you to move before getting up and helping others. If time permits and there is a small fire that can be put out with the fire extinguisher, do that.

2.3.2. If you are inside, decide whether to evacuate or stay put.

- Any of the following require immediate evacuation: Fire, damage to structure, a gas leak, or hazardous materials spill.
- In some situations, you may choose not to evacuate or to delay evacuation. For example, if there is a slight shaking with no apparent damage and another hazard such as severe weather, it may be more dangerous to move children outside.

2.3.3. Is there a gas leak?

- If you smell gas or hear a blowing or hissing noise, open a window and then quickly leave with the children, and shut the gas off at the outside main meter.
- Unless you must evacuate immediately (because of fire, severe damage to structure, gas leak, or hazardous materials spill), check all children and adults for injuries and give first aid for injuries before evacuating.
- Do not move seriously injured persons unless they are in immediate danger of further injury (from fire and flooding). Instead, cover them with a sturdy table or whatever is available and send someone for medical help after the earthquake shaking stops.

As time permits, you may need to turn off utilities such as gas, electricity, and water. If electrical wires are crackling inside, shut off the gas first, then turn off the master electrical switch.

If you must evacuate, get out of the building and to your designated safe gathering place, taking the emergency kit along with your list of children and their emergency contacts.

When possible, to reduce the chances of both physical and emotional harm, move children who are able to walk away from danger, away from collapsed buildings, and away from severely injured survivors. If you must leave the area, place a note for the parents outside the door, telling them where you are going.

- Call 9-1-1 if there is a fire or medical emergency. If the phone doesn't work, send someone for help.
- Treat minor injuries.

- Reassure the children. Tell them that their parents will come for them as soon as they can, that their parents know everyone will be safe with you, and that you are all together.
- Listen to a battery-operated radio for instructions and the latest emergency information.

2.3.4. Be prepared for aftershocks.

Aftershocks are follow-up earthquakes that are usually smaller than the first one. They are dangerous because they can cause things that were weakened in the first earthquake to fall down. You may need to Drop, Cover, and Hold again.

2.3.5. Re-enter with caution

After a minor earthquake or after you are informed by emergency responders that it is safe to reenter the building, open cabinets cautiously and beware of objects that might fall off shelves.

2.3.6. Children's reactions to earthquakes

Earthquakes can be terrifying, and it is natural for children and adults to be afraid. According to psychologists, earthquakes are especially difficult to cope with because they come without warning and are followed by aftershocks. With continued shaking, survivors do not experience a clear end to the crisis. Some children and adults may have reactions very soon after the event, while others may experience problems weeks or months later. The following tips will help you help the children in your care.

During an earthquake

During (and after) an earthquake, children will usually become tearful and clinging. They will want their: parent(s). Even toilet trained children may have accidents or experience nausea and vomiting.

Deal with the situation as calmly as you can.

In a disaster, the children will look to you and other adults for help. How you react to an emergency gives them clues on how to act.

As soon as you are sure the danger has passed

Let the children know that you understand why they are scared. Comfort them with a hug or reassuring words. Reassure them that their parents know where they are or where they may go. Their parents will come to get them as soon as they can. They are safe with you. You will look after them.

2.3.7. After an earthquake

- Return to routine as soon as possible.
- Express your own concerns openly, and let students know that it's normal to be afraid.
- Encourage the children to talk about their fears. Help them sort out what is real from what is unreal. Encourage them to draw or write about their feelings. Children are less afraid of things that they understand.
- Be aware that children begin to suck their thumbs, have difficulty eating or sleeping, wet their beds, or report mysterious aches or pains. It is common for children to

“regress” or act younger when stressed. Do not criticize the children or call such behavior “babyish.”

- Parents frequently look to you for advice, so help them understand their children’s behavior and be aware that they also may be suffering. Parents may be afraid to leave their children after a disaster. Some parents may be angry or upset because their children are frightened. Reassure them that with support most children will recover without any lasting problems.
- Watch children for ongoing signs of emotional distress (avoiding things that remind them of the event, appearing numb or withdrawn, having nightmares). If a child continues to be disturbed for more than a few weeks, the family may need to seek professional counseling. While most children recover completely after a disaster, others may have more long term problems that require treatment, including depression and posttraumatic stress disorder.
- Understand that you also may have emotional difficulties after a traumatic event and take care of yourself.

3. Students’ Workbook On Disaster Management

3.1. Classroom Activities & Exercises On Disasters

3.1.1. A “Disaster Corner”

- Help your Teacher create a “Disaster Corner” in your classroom, which should have a clear wall to put emergency directions on.
- It is also where you, your classmates and the Teachers put up posters, and post explanations of different types of disasters that happen in Fiji.
- Cut out appropriate articles from newspapers for the “Disaster Corner”.
- What else can you put in the “Disaster Corner”? What about a copy of the School Fire Drill? How about the escape route from your classroom?

3.1.2. Group Work

- Discuss the following in groups or in class and write your answers on a piece of newsprint or on paper to give your Teacher.
- If your group has access to a computer, you should type up your answers. Otherwise, your Teacher will be responsible for having this typed up and copied.
- Post a copy at the “Disaster Corner”.

3.1.3. First Aid & Emergency Kits

- What is a First Aid kit? What is an emergency kit? Do you know what the kits look like?
- Do you know where the First Aid kit is kept? What about the emergency kit?
- Is your teacher or any other teacher responsible for keeping the kits in good order?

3.1.4. Earthquakes

Earthquakes are sudden, striking with little or no warning. Be prepared in case it happens!

- Have earthquakes occurred near or at your school?

- What are the safest places in your classroom in case of an earthquake?
- What do you do during an earthquake?
 - o What would you do if you are in the classroom?
 - o What would you do if you are outdoors?
- What would you do after an earthquake?

3.2. Other Activities

3.2.1. Essay writing

- Take any of the six disasters – i.e. Earthquake, Cyclone, Flood, Landslide, Fire, or Tsunami – and discuss with your classmates or with your teacher. Take notes during discussion to help you when you write your essay.
- Use the appropriate appendix (at the back of this handbook) and your school library to find out more about your chosen topic. If you have access to a computer, you may be able to use the Internet for more research. Take notes for your essay.
- Write an essay on your topic, using your notes from the discussion, pamphlets and research.
- Submit to your Teacher for marking.

3.2.2. Drama or Skit

Your Teacher will ask if you, or a group of you, can write out a drama, a skit or a mime on a disaster topic. She or he will give you time to prepare. Consider the following:

- What do you know of your chosen topic? (Use the appropriate appendix at the back of this handbook. Can you learn more from the school library or the internet?)
- Study other dramas, skits and mimes to see how they are put together.
- Remember, a drama is longer than a skit or a mime, with two or more scenes.
- A skit or a mime is usually very short.
- Who are the good actors/actresses or quick studies in your class? Ask them to participate in your drama, skit or mime.

3.2.3. Poems, Chants, Songs, Meke/Dances, & Vernacular Writing

- Your teacher will ask you to write a poem about preparations for a hurricane (or another type of disaster), or a poem about happenings during a disaster, or one on cleaning up.
- The teacher will ask you or a group of you to create a chant, a song or a meke or dance about any of the disasters. Your teacher will be able to give you existing chants, songs and meke or dances which you can use as models. Ask your parents to help you.

3.3. Drills

Your teacher will guide you during each drill. For your safety and for the safety of others, it is important that you regularly practice the drills.

3.3.1. Earthquake drill

At the first sign of shaking:

Inside the classroom:

Practice the Drop, Cover, and Hold drill: Drop to the ground, clasp both hands firmly behind the head; or Take Cover by getting under a sturdy table or other piece of furniture. Hold on until the shaking stops. Stay in position until it is safe to move.

Outside the classroom:

Your teacher will do a roll call at the evacuation point, to ensure that all students have reached safety.

- Move into the open, away from buildings, fences, trees, tall playground equipment, utility wires, and street light. Move to your class' evacuation point.
- Kneel or sit on the ground and cover your head and face with your hands. Once in the open, stay there until the shaking stops

3.3.2. Evacuation Drill

Your Teacher will lead the evacuation of your classroom and school building.

- Do Not Panic
- Do Not Push
- Listen to Your Teacher's Directions

After leaving Building; there are 3 things you should do:

- Immediate Area Threat. Leave building and gather in the safe place your teacher directs you to.
- More Widespread Threat. Leave building and neighborhood, to a place your teacher directs you to. He/she will have transport arranged.
- Major Evacuation. Leave building and evacuate to a larger area that your teacher will direct you to. Teachers will organize transportation and drivers.

4. Creating an Evacuation Plan

The following questions should be discussed at a Special School Staff Meeting, a School Management Meeting, and a PTA Meeting, in order to prepare for evacuating classrooms and school buildings, in times of disasters such as Earthquakes, Fires, Cyclones or Hurricanes, Floods, Landslides, and Tsunamis. The school's evacuation plan is made when answers to the following questions are put together.

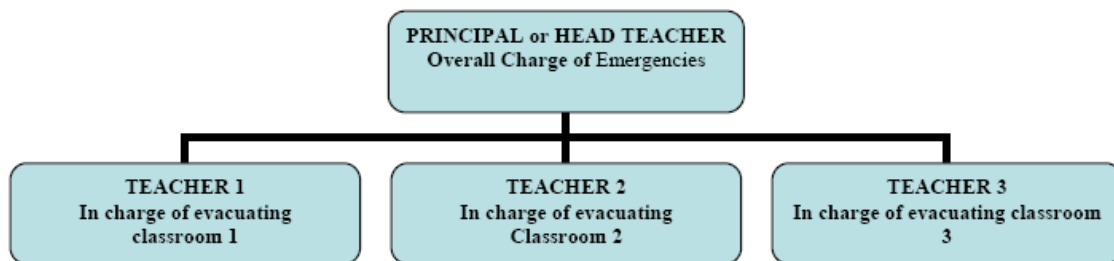
Evacuation Plan and Escape Routes

1. Does the Principal, the School Manager or the PTA Chairperson have an EVACUATION PLAN for the school? Do all teachers and other staff members know of this evacuation plan?
2. Are there ESCAPE ROUTES from classrooms, and other rooms in the school? [Are there escape routes from dormitories?]
3. Is there an ACCURATE FLOOR PLAN for each school building or for each floor of all school buildings?
4. Is there a fire alarm in place? Are there plans for regular fire and earthquake drills for all school children and teachers?

5. Where are fire extinguishers located?
6. Where are the assembly areas?
7. How are evacuation-routes planned?
8. Are there emergency kits, and where are they located?
9. Are there roll calls done in each classroom everyday?

The Organizational Chart: Roles and Responsibilities

1. Is there a list of all staff members, with their Names, Addresses, Phone Numbers, both regular and emergency and their position in the evacuation program? Who is responsible for this list and its maintenance?
2. Does the school have a CHART showing each person and who that person reports to, in order of responsibility? [See example below.] Where is the chart kept?



3. Is there a List of the Role and Responsibility of each staff member in an Emergency? Is there consideration of overlaps in case someone not able to fulfill role? Answer these questions:

- Who will provide First Aid?
- Who will take any Medications?
- Who will take First Aid Kit?
- Who will take Attendance Lists?
- Who will take Emergency Information on each child?
- Who will call for help?
- Who will carry Cellular Phone?
- Who will carry Emergency Kits out?
- Which Groups of children go with which Staff?
- Who makes sure everyone is out of the building?

Attendance Lists

Are there attendance lists for each class? Who maintains the lists? Who is responsible for roll calls outside the building? Do you know the following:

- Who is in the building?
- When they arrived?
- When they left?
- Do you have updated “Emergency Information” on the children, and staff members?

Emergency Evacuation Plan

- What are the emergency plans or evacuation plans for each disaster? (Disasters including Earthquakes, Fires, Tropical Cyclones or Hurricanes, Floods, Landslides, and Tsunamis)
- Who is in charge of the evacuation?
- How will transport be organized?
- Are there cellular phones available in case of an emergency? Who will contact parents?
- Are there alternative gathering areas for each type of emergency?
- Are you aware of the Red Cross or the National Disaster Management Unit designated mass shelter nearest to your school?
- At this stage, a Draft Evacuation Plan is made, which is to be considered by all school stakeholders – the teachers, the management, parents and children.

Evacuation Procedure

- What procedure should staff members follow when at designated assembly area? Who does the writing?
- What should be the first and last thing to do? Why is this important?
- How will parents be notified. Is there a telephone tree for parents to call other parents in the event staff cannot make that many calls?
- Give all parents an up-to-date Emergency Information Sheet.

Emergency or Disaster Kits

- What types and how many types of disaster/emergency kits should there be?
- Who can help you make up the kits?
- What other material would you consider for inclusion in the kits?

Parents Emergency Evacuation Information Form

- What information do you need from parents?
- What information should the school give to parents?

Essential Information

- What essential information should all staff members know?

Responsibilities during Emergencies

Which staff persons will do what during an emergency? Who will be responsible for the following: taking of attendance, emergency kits, first aid supplies, child specific medications, etc.? Do you have specific training / drill dates?

1. Introduction

In the past few decades a number of disasters, both natural and man-made had occurred in all parts of the world: a cyclone in Bangladesh or a creeping drought in Somalia which has led to not only loss of lives and properties but also has taken a step back the development efforts so far achieved by man kind.

Disaster risk is not inevitable but the damage can be reduced or altered through proper awareness generation activities and education. Education and awareness generation activities will thwart away and avert the misconception and myths one has on issues related to disasters. It will help communities to and disaster loses and effects

Planning should be decentralized in which the communities are involved in all aspects. Technology, which are both modern and traditional should be considered simultaneously throughout the process when disaster risk reduction activities are taken into account.

The earthquake educational booklet has been prepared for teachers covering the basic information related to earthquake safety. Teachers are an important entity of the community, who not only, has the capacity to influence the society but also has the ability to shape an entire generation through their wisdom.

2. Terms related to earthquake

1. Aftershock: An earthquake, which follows a larger earthquake or main shock and originates at or near the focus of the larger earthquake. Generally, major earthquakes are followed by a larger number of aftershocks, with decreasing frequency.
2. Epicenter: The point on the Earth's surface directly above the hypocenter of an earthquake.
3. Focus: The point within the Earth from which originate the first motion of an earthquake and its elastic waves.
4. Focal zone: The rupture zone of an earthquake. In the case of a great earthquake, the focal zone may extend several hundred kilometres in length.
5. Pre shock: A small tremor that commonly precedes a larger earthquake or main shock by seconds to weeks and that originates at or near the focus of the larger earthquake.
6. Hypocenter: The calculated location of the focus of an earthquake.
7. Fault: A fault is a break in the rocks that make up the Earth's crust, along which rocks on either side have moved past each other.
8. Focal depth: The focal depth refers to the depth of an earthquake hypocenter.
9. Liquefaction: Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading.
10. Magnitude: A measure of the strength of an earthquake or strain energy released by it, as determined by seismographic observations. The local body wave and surface wave magnitudes will have approximately the same numerical value.
11. Intensity: Intensity is a qualitative measure of the actual shaking at a location during an earthquake, and is assigned Roman Capital Numerals. There are many intensity

scales. Two commonly used ones are the Modified Mercalli Intensity (MMI) Scale and the MSK Scale (named after its inventors Medvedev, Sponheuer and Karnik).

12. S-waves: In this, motion is perpendicular to the direction of wave propagation
13. P-waves: In this, the ground is alternately compressed and dilated in the direction of propagation
14. Seismicity The geographic and historical distribution of earthquakes.
15. Seismograph: It is an instrument for detecting and measuring the intensity and direction and duration of movements of an earthquake.
16. Seismology: It is the study of earthquakes and seismic waves that move through and around the earth
17. Rapture front: The instantaneous boundary between the slipping and locked parts of a fault during an earthquake.
18. Richter Scale: The Richter scale is used to describe the magnitude scale, or the power of the earthquake.

3. Earthquake

An earthquake is a sudden violent motion of the earth, which lasts for a limited time within a very limited region. It occurs almost in every parts of the globe but some places are more prone to earthquake due to the geological condition the place belongs to. Tremendous amount of energy is released during an earthquake which caused widespread damage not only to infrastructure but to lives and properties. The degree of destruction caused by an earthquake depends on the following factors:

- Magnitude of the earthquake
- Type
- Depth
- Distance from epicenter
- Soil Conditions
- Preparedness of population
- Time of day
- Duration

There are two main causes of earthquakes. They can be linked to explosive volcanic eruptions or can be triggered by tectonic activity, with the latter being the cause of most of the earthquakes. Earthquakes are classified based on the magnitude on the Richter scale:

- Slight - magnitude up to 4.9
- Moderate- 5.0 to 6.9 magnitudes
- Great 7.0 to 7.9 magnitudes
- Very Great-8.0 and more magnitudes

3.1. Waves

A wave travels through a material when a force pushes on that material and the material resists being pushed. Earthquakes produce two types of body waves, called P- and S-waves. P waves are sound waves. The particle motion in all sound waves is compression which means that the particles move in the same direction as the wave as described in the example above. S waves are shear waves. The particle motion in shear waves is perpendicular to the direction of the wave. Shear waves are only seen in solids and cannot transmit through a liquid or a gas.

3.2. Effects

Earthquakes have many ways to leave their mark on the land, and most of them are bad. Some of the effects of the earthquake are listed below.

- Ground shaking
- Surface faulting
- Liquefaction
- Landslides
- Fires
- Tsunamis

Among the effects the most dangerous one is a Tsunami. Tsunamis are huge waves that can cause floods and can be up to 100 feet tall at times. They often strike a long way away from the quake, and are very deadly

3.3. Affect

Whenever the earth jolts it has left immense damage to infrastructures, buildings or bridges, roads, dams, retaining walls etc leading to loss of lives and properties. Some of the affects can be felt immediately while some are slow. The direct consequences that can be observed as an affect of earthquake are as follows :

- Damage to weak buildings or structures
- Impinging the social life and the social fabric set up by the people due to displacement and death
- Loss of personal belongings and properties
- Loss of lives, injuries and physical disabling

The destruction and the losses that an earthquake triggers depends on the following factors:

- Magnitude
- Type
- Depth
- Distance from epicenter
- Soil Conditions
- Preparedness of population
- Time of day
- Duration

4. Seismic Risk in India

India has been divided into four seismic zones named as zone II to zone V as per the seismicity of the areas. Earthquakes are more common along geological fault areas. If we study the seismic zone map, we see that in India, the areas most vulnerable to earthquake are Andaman and Nicobar Islands, North Eastern India, parts of North Western Bihar, Uttaranchal, Kangra valley in Himachal Pradesh, adjoining areas of Srinagar in Jammu & Kashmir and the Rann of Kachch in Gujarat. Three of the major metropolitan areas in India namely Delhi, Mumbai and Kolkatta lie in zone IV, which is a high damage risk zone.

- Zone V: This is the most severe seismic zone and is referred here as Very High Damage Risk Zone. The Himalayan mountain states such as parts of Kashmir, Himachal Pradesh, Uttaranchal, North eastern states and Andaman and Nicobar Islands and Kutch District of Gujarat are referred as Very high Damage Risk Zone. Earthquakes of magnitude 10 on Richter scale may occur in this zone.

- Zone IV: This zone is second in severity to zone V. This is referred here as High Damage Risk Zone. Remaining parts of Jammu and Kashmir, Himachal Pradesh, parts of Gujarat, Punjab, Haryana, Rajasthan, foothills of Uttar Pradesh and Bihar comes under this zone. In this zone, earthquakes up to magnitude 8 on Richter scale may occur.
- Zone III: This zone is termed as Moderate Damage Risk Zone where earthquakes up to magnitude 6 on Richter scale may occur. This zone comprises the areas of remaining parts of Punjab, Haryana, Uttar Pradesh, West Bengal and parts of Gujarat, Rajasthan, Andhra Pradesh, Maharashtra, Karnataka, and Kerala.
- Zone II: This zone is referred as low damage risk zone where the chances of earthquake are less. Parts of Rajasthan, Madhya Pradesh, Karnataka, Tamil Nadu, Jharkand and Chattisgarh come under this zone.

4.1. Indian earthquakes:

In the past few decades the Indian sub-continent has experienced some major earthquake measuring 7 and above magnitude in the Richter scale. Let us see some of the major earthquakes in India:

Earthquake location	Year	Magnitude
Uttarkashi, Uttaranchal	20 October 1991	6.6
Latur-Osmanabad, Maharashtra	30 September 1993	6.3
Jabalpur, Madhya Pradesh	22 May, 1997	6.0
Chamoli District, Uttaranchal	29 March, 1999	6.8
Bhuj, Gujarat	26 January, 2001	6.9
Kashmir	8 October, 2005	7.6

5. Disaster Management

The rapid growth of the world's population and its increased concentration often in hazardous environment has escalated both the frequency and severity of natural disasters. These natural disasters are mostly of geophysical origin such as earthquakes, volcanic eruption etc, so it is not feasible to control nature and to stop the development of natural phenomena but efforts could be made to avoid disasters and decrease their effects on human lives, infrastructure and property. Therefore it has become the need of the hour to prepare and train communities throughout the disaster management cycle so that they would be disaster resilient.

Earthquake management:

5.1. Before an earthquake

- Repair deep plaster cracks in ceilings and foundations. Get advice from experts if there are signs of structural defects.
- Secure falling and blocking objects
- Place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods; glass etc in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from places where people sit.

- Store chemical products and flammable products securely in closed cupboards with latches at the bottom shelves.
- Identify safe places indoors: Under strong dining table, bed. Against an inside wall Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over
- Make an evacuation plan for your family.
- Educate yourself and family members
- Know emergency telephone numbers (doctor, hospital, police, etc)
- Keep an emergency kit.
- Keep calm and keep others calm.
- Do not use lifts.
- Arrange your house in such a way that it is possible to move more easily, keeping corridors clear of furniture and objects

5.2. During an earthquake:

5.2.1. If indoors

- If you feel a shake, duck under a desk or a strong table. Tightly hold the objects underneath which you are taking refuge. If there isn't a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Stay under the beam of an inner door or in the corner of a room.
- Stay away from glass windows or doors.
- Protect yourself from anything that could fall like cupboards, electrical fixtures etc
- If you are in the bed at the time of the tremor, stay the way you are. Protect your head with a pillow. If you are under a heavy light fixtures that had the chances to fall then move to the nearest safest place in the room.
- Stay inside in the house until the shaking stops and it is safe to go outside.
- DO NOT use the elevators.
- Evacuate slowly and quickly after the shaking stops.
- Watch out for any dangers like fire, landslides etc which might have been triggered by the earthquake.

5.2.2. If outdoors

- Stay in the place if there is no objects that might fall or cause injury.
- Move away from buildings, trees, streetlights, electric wires and poles.
- When you are in the open, stay there until the shaking stops.
- Do not take refuge under any weak structure
- Stay away from collapsing walls, flying glass, and falling objects.

5.2.3. If in a moving vehicle

- Stop as quickly as safety permits and stay in the vehicle.

- Do not stop near or under buildings, trees, electric poles and wires.
- Drive cautiously after the earthquake has stopped.
- Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

5.3. After an earthquake

- Listen to warning information in the radio /TV
- Keep away from beach area. Huge waves might occur.
- Expect aftershocks. Be prepared.
- Turn off water and electricity.
- Do not turn on switches. There might be gas leaks or short-circuits.
- If there is a fire, try to put it out using a fire extinguisher or a sand bucket depending on the type of fire.
- Immediately clean up any inflammable products that might have spilled (alcohol, paint, etc).
- Clear up if there is any broken glasses from shattered window panes or doors
- Inform and help the rescue team if you know of any persons buried.
- Stay away from places where there are loose electric wires.
- Do a rapid survey of the building .Immediately evacuate if you see any sign of damage.
- Do not re-enter badly damaged buildings or go near damaged structures
- Do not walk around the streets to see what have happened

6. Emergency utility kit:

The emergency utility kit comprises of items of basic needs which we required at the time of any emergency. Most of the items are easily available. What one needs to do is organized them in such a way for finding and carrying it easily. Some of the basic things that should be part of the kit are listed below:

- Bottled water
- Dry food and fruits
- First aid kit
- Important files and papers
- Prescribed medications
- Matchbox or lighters
- Cash and expensive materials like jewelry 1
- Battery and flashlights
- Emergency contact numbers and addresses
- Blankets
- Toiletries and other personal hygiene items

7. Disaster Safety plan:

A disaster safety plan should be prepared in advance before any hazards. This plan will help and prepare the community or the individuals to face the disaster more effectively. There should be a disaster safety plan in every commercial or residential establishment. In addition to these, a personal as well as a community safety plan should also be there. Let us observe some of the pre-requisite factors required for preparing the disaster readiness plan:

Individual or family earthquake safety plan:

- Prepare an emergency evacuation plan for your family.
- Spread awareness on local specific hazards to your family members.
- Mark the safe areas in each room like a strong table or corner near the walls etc.
- Know the danger spots like glass windows, mirrors, hanging objects etc
- Practice mock-drills frequently
- Plan your emergency kit
- Survey and secure all falling and blocking objects in the house.
- Learn the basic first aid measures
- Keep all flammable and chemical substance securely in the house.
- Learn how to switch off the main switch of the electricity supply.
- Pre-determine in advance who is going to provide assistant to person with disability (PWDs) or the aged if required.
- Decide the location where you are going to take refuge.
- Secure all breakable and heavy objects on the lower shelves of the cup-boards and latch them from outside.

8. Community earthquake safety plan:

- Prepare an emergency evacuation plan for your community.
- Spread disaster awareness to the community
- Identify safe refuge areas in the community.
- Practice community mock-drills
- Plan an emergency resource centers and stock all the kit required at the time of disaster.
- Learn and train others on life saving skills like first aid, search and rescue etc.
- Know your community people and their skills. List out whose skills could be used at the time of any disaster.
- Chalk out plans for helping PWDs at the time of disaster

9. How to do an earthquake drill?

Before organizing a simulation exercise for any hazards it is very important to find out the hazards that could be followed after the main hazards for instance after an earthquake there are possibility for a fire. So the simulation exercise should also incorporate the affect of the main hazards. Some of the steps that could be followed while doing an earthquake drill are listed below:

1. Prepare an evacuation map for the concern institute say for example if it is a school then make a school evacuation map.
2. Prepare roles and responsibilities of the various stakeholders
3. Chalk out the sequence of the exercise.
4. Provide training on life saving skills like first aid, search and rescue methods etc.
5. Remove objects or materials that might block the evacuation route and secure it properly.
6. Keep basic emergency resources and materials required at the time of disaster
7. Practice simulation exercise. Review and update the whole exercise if needed.

School Earthquake Safety



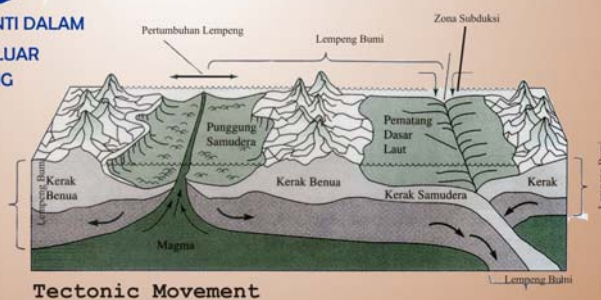
Cooperation between UNDESA and CDM-ITB
on Reducing Vulnerability of School Children to Earthquakes
in Asia-Pacific Region
2008



What is Earthquake ?

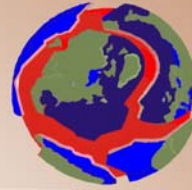


- Earthquake is vibration that is felt at the ground surface
- Earthquake happens because there is energy releasing when earth plates, that are shifted each others, are released or broken
- The earth plates are shifted each others because earth surface always move

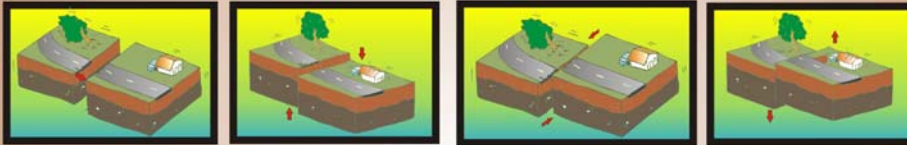


Tectonic Movement

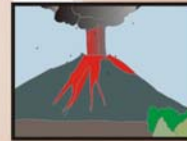
Types of Earthquake :



- Tectonic earthquake: cause by earth plates movement



- Volcanic earthquake: cause by volcano
- Induction earthquake: cause by the landslide and other sources



Earthquake does not kill people, but building does.

Until now, there is no technology that can predict when, where and how large the intensity of the earthquake accurately.

2

What should be done before earthquake ?

- Recognizing what earthquake is
- Identifying dangerous objects
- Concerning location of the door and emergency
- Determining the evacuation route and place
- Learning to give first aid
- Learning to use fire extinguisher
- Taking note on important phone number



Danger due to earthquake and simple ways to prevent it :

- Furniture (wardrobe, cabinet, etc) is arranged to stick on the wall (nailed/tied) to prevent the objects from falling, collapsing, or shifting when earthquake happens.
- Ascertainning that the structure and location of the school can be avoided from danger caused by earthquake (such as, landslide, liquefaction, etc).
- Evacuation and strengthening the structure to avoid the danger of earthquake.

3

How to protect yourself during earthquake ?

- DUCK
- COVER = cover under furniture (table or chair)
- If there is no an opportunity to cover under the table, cover your head with the other objects, example: bags
- HOLD = hold tight the table's legs



Train to protect yourself :

- Cover under the table and protect yourself
- If the space under the table have been fully filled, duck near the door and hold tight the frames or duck at the corner of the room and protect your head with bag, books, or other object
- If the vibration has subsided, follow teacher's instruction. If there is no teacher, listen to the announcement from the loudspeaker



4

What should be done after earthquake?

EVACUATION = measures, after earthquake subsiding, in order to move to the safer place

Evacuation ways:

- Protect your head
- Form a line
- Follow the teacher's instruction to the evacuation place

After earthquake shaking, form a line, follow teacher's instruction !!

At the evacuation place (field) :

- Check for the left students
- Check for the injured students
- Give the first aid
- Ask a help from the adult

REMEMBER....REMEMBER !!!!!

- Do not panic
- Ask a help from the adult until the situation safe enough



5

SECTION III: PRACTICES

1. Earthquake Drills In Uzbekistan

In school N 20 of Tashkent, the special attention during school safety trainings was given to advanced techniques of training of school children to rules of behavior during earthquakes. Teachers have mastered widely used way of response to earthquakes: « To sit down, be covered and lean ». Also teachers of school have received the information on development of the plan of preparation of school to emergency situations and realization of imitating doctrines with attraction of all personnel of school and pupils. To members of parental committee and active workers of makhalla (neighborhood community) their role in preparation of school for earthquakes and their participation in elimination of consequences of probable emergency situations was explained.

During training of the teacher of school have familiarized and have discussed the contents of the manual and posters developed within the framework of the UNCRD project. Small remarks were made and offers are brought. As a whole the collective of school has approved the contents of manuals and posters developed within the framework of the project. After the given training each teacher have transferred the received knowledge to pupils of the classes.

The Expert of the project on training Tursunov Kh. has checked up a level of development by school children of necessary knowledge and highly estimated work of teachers of the given school. Then Tursunov Kh. was carried out exemplary lesson with pupils of school. In it skills of response were fulfilled during earthquakes in class, in corridor of school and in the street. School children have well mastered receptions of acceptance of protective position under school table and applications of a rule "to sit down, be covered, lean". During training with school children on response skills the special attention was given to type of a building in which pupils live. So at schools N 20, 116 and 112 majority of pupils live in the houses, in the majority made with application of adobe materials. Pupils have mastered skills of reaction in multi-storey houses and in the houses constructed from low quality building materials.

On an example of one class at the presence of group of teachers of initial classes the imitating doctrine on reaction to strong earthquakes and to the subsequent evacuation of pupils from a building of school was carried out. The prepared pupils have shown good skills of reaction. It is necessary to note, that right after commands of the teacher, children were covered under school tables and began to count. This approach is widely applied in many countries, to sustainable preservation of mentality of children during display of forces of nature. Then the class quickly has gathered and children, having covered heads with portfolios from probable falling fragments of building on the part of bearing wall of corridor in which there are no windows, have quickly left building and were built for muster in the open, beforehand planned district. Teachers and pupils with the big interest participated in all trainings and imitating drills and have remained pleased by level of their realization.









2. The School Children's Earthquake Drills on SDN Cirateun Kulon Bandung

2.1. Summary of scenario for Earthquake Drill

On Saturday, December 18, 2007, all of the students from grade four doing their routine activity in class. Today they are learning about mathematics subject. Suddenly at 09.15 AM something shaking their class. They do not realize it was an earthquake 6.5 Richter Scale. They are panic and everybody wants to safe themselves. Some of the students are hide under the table, try to get out from the class to the yard, crying, and screaming. The teacher also panic and confused what should she done to safe herself and her student from this shaking.

2.2. Agenda for Earthquake Drill:

1. Briefing about purpose and benefit from this activity.
2. Explanation:
 - Earthquake phenomenon,
 - Factors cause of earthquake,
 - Preparation steps before earthquake,
 - Rescuing steps during an earthquake, and
 - Evacuation steps after earthquake.
3. Interruption an earthquake sign with siren and sound of thundering landslide.
4. Discussion about reaction what had they done when siren on.
5. Identification dangerous goods inside the class and area around the school.
6. Mapping school and area around it.
7. Group of presentation continue with discussion about identification dangerous goods and mapping school and area around it.
8. Earthquake Drill (EQ Drill) and evacuation.

EQ Drill is a simulation on how to make the right self-rescue if earthquake happen. Self rescue with position Duck, Cover, and Hold. Duck is stay down under the table with squatting position like duck. Cover is protected the head from glass fraction or other stuffs that falling down from the roof. Protection the head can use bag or textbook. Hold is handling the leg of table. Duck, Cover, and Hold are standard position during an earthquake. Evacuation conducted after an earthquake. The school children make a line in quiet way to the saver place with orderly and forbid run, do not panic, do not push each other, and no joking. All of the instruction can be use by the teachers.

Documentation of Earthquake Drill:



Figure 6: The Committee gave instructions to teachers



Figure 7: All participants



Figure 8: Speech from Headmaster of SDN Cirateun Kulon

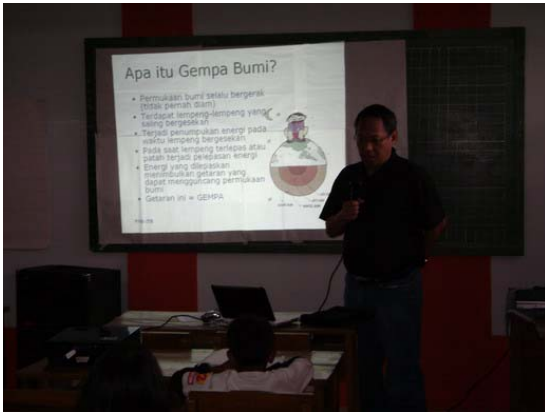


Figure 9: Short Course an Earthquake Subject



Figure 10: Short Course an Earthquake Subject



Figure 11: Short Course an Earthquake Subject



Figure 12: Interruption an Earthquake



Figure 13: Interruption an Earthquake



Figure 14: Interruption an Earthquake



Figure 15: Identification Dangerous Goods



Figure 16: Evaluation for Identification Dangerous Goods

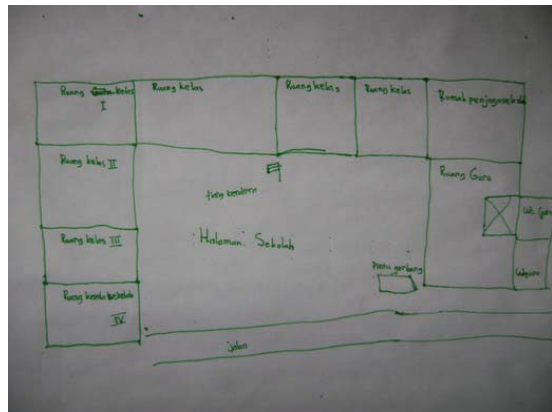


Figure 17: Mapping school



Figure 18: Class evacuation route



Figure 19: Earthquake Drill and Evacuation



Figure 20: Earthquake Drill and Evacuation

3. Training for Teacher at SDN Cirateun Kulon Bandung and SDN Padasuka 2 Soreang

3.1. Agenda Training for Teacher:

There are two schools that involve in this project. The two schools are SDN Cirateun Kulon in Bandung and SDN Padasuka 2 in Soreang. SDN Cirateun Kulon has 17 (seventeen) teachers and SDN Padasuka 2 has 13 (thirteen) teachers. Based on discussion between facilitator from CDM ITB and school teachers, we decided:

- To organize the training in two days at CDM ITB Meeting Room
- Each school dispatch 10 teachers include the headmaster

Because of one and more reasons about budgeting for carried out this training, facilitator from CDM ITB for UNCRD project agreed to have collaboration with facilitator from CDM ITB for GRIPS project. These projects also have the same objective to training teachers for reducing vulnerability to earthquake at school. Facilitators also arranged their joint program to establish this training. Subject matter for this training consists of concept of earthquake, hazard, vulnerability, earthquake drill, using booklet, and preparedness for earthquake safety.



Figure 21: Training for teachers



Figure 22: Training activities

4. Teachers' training on Disaster Risk Reduction Shimla, Himachal Pradesh

4.1. Introduction

Across the world 875 million school –age children are in the countries with high levels of seismic risk. As examples have been consistent in proving how school children are amongst the worst affected at the time of any natural disaster, UNCRD (United Nations' centre for regional development) recognized the need to intervene and has initiated a project titled 'Reducing vulnerability of school children to earthquakes in Asia-Pacific Region. SEEDS (Sustainable Environment and Ecological Development Society), the local partner of UNCRD, has selected Shimla, Himachal Pradesh as the project area in India due to high seismic vulnerability of the region. To uphold the aims and objectives the project had envisaged to make school community disaster resilient through the process of self help, co-operation and education the first teachers' training on disaster risk reduction was organized in Shimla, Himachal Pradesh.



The objectives of the training were:

- To provide awareness on hazards pertaining to the region
- To impart knowledge on disaster risk reduction focusing on earthquake safety.
- To train teachers to develop disaster management plan for their school including mitigation plan, preparedness plan and response plan.
- To train the participants on life saving skills
- To make the teachers as master trainers, capable of training the students and community at large.

Selection of the participants

The participants were selected from the list of teachers given by the Department of Elementary Education, Shimla. The teachers of the schools in which seismic retrofitting of the school buildings are being undertaken were given priority while short listing the participants' list.

4.2. Training Methodology

The training was conducted by experts from various fields using power point presentation. Short films and documentaries were also screened. Practical life-saving skills with special emphasis on the skills which are required at the time of any disaster were also demonstrated by the resource persons.

Course content of the workshop

The course contents of the workshop were:

- Disaster management –Basic concepts hazards and vulnerabilities of Himachal Pradesh
- Earthquake: Understanding the hazard, causes, effects and do's and don'ts of earthquake safety
- Landslides-Understanding the hazard, causes effects and its precautionary measures
- Floods-Understanding the hazard, causes effects and mitigating measures
- Structural safety
- School disaster management plan
- Non-structural safety
- Evacuation Planning and Earthquake drill
- Search and rescue Methods
- First Aid skills
- Fire safety Methods
- Psychosocial support skills

4.3. Summary of activities

The training workshop for teachers on disaster risk reduction was organized for three days consecutively from 25th to 27th August '08 at Health and Family welfare center, Parimahal, Kasumpti. The training was attended by a group of twenty teachers from Shimla.

Day I:

The first day of the workshop began with the welcome note to the participants. This was followed by a brief orientation on the project and the aims and objectives of the workshop. The participants then introduced themselves and shared their expectations from the workshop.

4.3.1. Session I: Disaster Management –Basic concepts, hazards and vulnerabilities of Himachal Pradesh

The session was very interactive with the speaker involving the participants entirely during his session. The speaker had oriented the participants on different technical terms and terminology giving up to date and local specific examples. He detailed out the types of natural disasters into: water or wind related disaster, climate related disaster, and mountain area related disaster and geological disasters. He linked some natural disasters in India with environment degradation by quoting examples of receding mangroves in the Sundarbans region or the glaciers melting in the Himalayas as some causal factors that might have contributed to the disasters that had occurred in the past few decades. The speaker then discussed the effects of disaster on human kind, livestock and other economical and infrastructural developmental efforts of a nation. He also discussed on the vulnerable

groups at the time of disaster and the reason for their vulnerability. The session further continued with the speaker discussing on the various mitigating activities that could be undertaken to minimize the damage cause at the time of disaster. The paradigm shift in the approach of disaster management and the roles and responsibilities of various stakeholders were also discussed in details. The speaker further spoke about Himachal Pradesh specific hazards.



4.3.2. Session II: Earthquake –Understanding the hazard, causes, effects and its precautionary measures

The speaker discussed about the various terms and terminologies which are necessary to understand the phenomena of earthquake. He then focused his session on the scientific reasons why earthquakes happen and why there is variation at the amount of losses and destructions in different regions from the same earthquake. He also spoke in details the scientific methods of recording an earthquake and how the records could be converted into measurements for scientific studies and research. The session continued with the screening of a short documentary titled “earthquake: dos and don’ts’ made by UNDP, India for awareness generation activities in the Northeastern belt of India.

4.3.3. Session III: Landslides: understanding the hazard, causes effects and its precautionary measures

The speaker started his session with a brief orientation on the basic terms and terminologies relevant in understanding the concept of landslide. He then further spoke about the classification of landslides and the morphological and physical causal factor for it. He also spoke about the direct and the indirect impacts of landslides on human kind and the built environment taking instances from Shimla. The participants could relate to examples more easily and a lot of queries concerning the mitigation activities had come out during the course of the session. The speaker shared that the roles and responsibilities to respond or do the mitigation activities should not only be for the government. But it should be an activity where every multi-stakeholders has their roles and responsibilities. He spoke about the risk-control and possible mitigation activities to reduce the effects of landslides. The speaker also spoke about the importance of advocacy work and the various

channels of communications that could be adopted for generating awareness to the masses like media campaign, workshops, trainings etc.

Session IV: Floods- understanding the hazard, causes effects and its mitigating measures

The speaker of the session spoke about the different types of flood and cleared the notion that flood occur only in plain areas. He spoke about the possibility of flood that might take place due to failure of any man-made structure like dams, big storage water tanks etc. He explained the causes and the effects of flood in details and also cited cases on mitigation measures practiced by people in other parts of the world. The second day of the workshop started with the re-cap of the sessions of Day I of the workshop by the participants. During this session the participants also shared some of the things they would want to learn during the remaining two days of the workshop as a value addition to the sessions they have attended on Day I.

Day II:

4.3.4. Session I: Structural Safety

The speaker started his session by showing images of buildings that had been damaged and reduced into rubbles by disasters. He then spoke about the factors that contribute on the performance of a building at the time of an earthquake like ductility of the building material, building configuration (shapes of the building), the nature of soil where building should be constructed etc. The speaker also discussed on the ideal construction design and shape which should be used while constructing buildings by giving emphasis on Himachal Pradesh specific cases.

The speaker demonstrated the risk of having wide openings in a building with the help of a sheet of paper. He demonstrated that buildings with fewer openings manage to withstand the effects of an earthquake better than the one with more openings in the form of bigger window frame, door frame etc. He also spoke on how to make old existent buildings safe from earthquake by adopting and strengthening the structure through retrofitting activities.

4.3.5. Session II: Disaster movie

A short film made by BMTPC (Building material and technology promotion council) for public awareness generation on issues relevant to disaster was screened. The film covered various awareness generation information on India specific natural disasters and also mentioned mitigation measures that could be adopted to minimize the effects of disaster.

4.3.6. Session III: Non-structural safety

The session started with the speaker listing out what are the different types of nonstructural elements of a building. He then gave an idea the risk and damage that could be caused due to non-structural elements in houses, schools etc through examples and illustrations. He then spoke about the possible avenues where non-structural measures could be done in a house or an institution using locally available fasteners or other materials. A small animation film highlighting the importance of non-structural measures were screened to the participants.

Earthquakes dos and don'ts and model demonstration A session on the right actions one should take up before, during and after an earthquake was taken up as per the request of the participants. In this session the resource person demonstrated the right method of doing 'duck, cover and hold' and explained the importance of it. He also provided the

alternative methods of protecting oneself in whatever condition or location one is at the time of the earthquake. A demonstration on the risk and damage that might occur due to non-structural elements was demonstrated using model miniature building to the participants.



4.3.7. Session IV: School Disaster Management Planning

The speaker of the session spoke about the various concepts and approaches related to prepare a school disaster management plan. In this session, he highlighted the importance of preparing a disaster management plan in schools and explained the different methodology require while preparing a plan in school. He also spoke about the different stakeholders who are involved and their roles and responsibilities throughout the disaster management cycle. The speaker spoke in details all the procedures require in drafting a school disaster management plan giving examples and simplifying the process.

4.3.8. Session V: Evacuation planning and earthquake mock drill

The session started with the speaker emphasizing the importance of evacuation plan in any institutions or buildings. Then a practical demonstration on how to make a plan was shown. The speaker also spoke on the step by step process of doing a mock drill with special reference to earthquake drill in schools.

Day III

4.3.9. Session I: Search and rescue methods

The next session continued with the resource person demonstrating different techniques of search and rescue. Methods involved in rescuing injured people from specific location like high rise building, debris etc were also demonstrated and practiced during this session. The methods taught during this session were simple and life saving methods which are practical and essential not only at the time of disaster but during non-disaster time also. The tools and the equipments used while demonstrating the methods were easily available household materials like ropes, wooden /iron rod, blankets, chair etc



4.3.10. Session II: First Aid skills

The session continued with the training of the participants on the first aid skills. Various first aid skills required at the time of bone fracture, cuts, poisoning, chalking etc were demonstrated to the participants. Children specific related accidents and the first aid measures involved in such cases were also demonstrated and discussed in details.



4.3.11. Fire safety methods

The next session of the workshop was on fire safety skills. The resource person displayed and discussed the different types of fire extinguishers and its components. He also spoke about the nature and type of fire extinguishers that should be used for specific type of fire. He also gave some tips on dos and don'ts related to fire safety.

4.3.12. Psychosocial support skills

The session started with the screening of a short film made by UNICEF, India titled 'life has changed'. The film that was shown was based on the importance of psychosocial support intervention at the time of disaster. This was followed by the resource person orienting on psychosocial first aid for school children and the different ways of diagnosis the problems. The methods of intervention were also taken up mentioning examples related to the present generation children.

4.4. Lesson learnt:

The lessons learnt during this workshop were:

- Not to plan the practical demonstration session like search and rescue on the final day of the workshop so that the participants have time to clarify their doubts.
- To increase the time allotted for practical sessions
- To make the theoretical session more interesting by using innovative methods
- To add more session on other disasters like tsunami, cyclone etc.