

## 4.1 Project Outcomes: Fiji

### 4.1.1 Vulnerability Assessment and School Retrofitting

A methodology for assessing the seismic vulnerability of schools had first to be developed, as none existed prior to this. The Chief Structural Engineer, PWD Mr Sia Ansari and Mr Robert Pole representing the Fiji Institution of Engineers (FIE) developed the “Earthquake Evaluation Process” that has been piloted in five schools in the larger Suva area. A survey questionnaire “Field Measurements Required for Initial Earthquake Evaluation Process of Schools” was sent to ten schools in Suva whose response provided the initial basic information on which the Project Technical Team assessed the levels of exposure to gauge high risk building and whether a more detailed on site follow up was warranted.



Figure 4.1 Heavily damaged portion of a school building in Suva, Fiji

A follow up field visit was found necessary on all the schools that returned the completed survey questionnaire:- Adi Cakobau, Suva Muslim, Nasinu Muslim, St Annes, St Agnes, Ballantyne Memorial School, Mahatma Ghandi, Suva Vocational Schools.

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 for Seismic Risk. An SPS score of less than 33 means the building fails to meet minimum earthquake safety standards;

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

#### Results

- The survey questionnaire for preliminary earthquake risk assessment was very well completed by all but one school that returned the forms
- In each school there was at least one building that needed further on site technical assessment
- All the buildings in which further on site technical assessment was done failed to meet earthquake safety standards with over 80% bracketed in the least and worst grade.

## Discussion Issues

1. This small sample in Suva implies a potentially very dangerous national picture that our schools are not adequately safeguarded against earthquake risk hence we are potentially putting children's lives at risk in all schools. Earthquake disasters around the world have proven to be the most lethal among natural disasters, inflicting huge losses on life and property and damaging the affected area's economy, social organization, and cultural heritage. The NDMO is urged to liaise with the Ministry of Education and undertake a national survey of schools using the survey questionnaire "Field Measurements Required for Initial Earthquake Evaluation Process of Schools".
2. A major fault found throughout is the lack of preparedness and other measures to mitigate fire hazards, particularly provision of adequate egress in double storey women's dormitory buildings. What exist are death traps.
3. The opportunity for this Project to work in closer cooperation with the EU Schools project should be seriously pursued with the MOE by the NDMO.
4. The Project needs input of funding and technical resources to successfully implement the activities during the project work and workshops.



Figure 4.2 Example of retrofitting in Suva, Fiji

### 4.1.2 Education and Raising Awareness

Training Workshop for Teachers

Date: 2nd December 2007

Venue: Salvation Army Hall, Suva

Participants: school supervisors from Ministry of Education (MOE), education expert, selected school teachers in charge of the occupational health and hazard management unit, PWD and CATD.

Modules:

- I. Hazard, vulnerability and risk of earthquake in the Fiji Islands in the context to safety of school system
- II. Preliminary self assessment of school facility against potential earthquakes.
- III. Rapid response to emergency situations
- IV. Role of school administration, teachers and students in emergency management planning in the schools.
- V. Preparedness and mitigation measures in schools
- VI. The structure of drill exercise to be carried by teachers and students.

### Earthquake drill

The Disaster Awareness Committee was formed after a Disaster Management Workshop by National Disaster Management Office, where the importance of disaster management was highlighted, and the need to have disaster management plan for each school.

As being felt with the full impact of tsunami waves, the schools along the coast line are under the greatest threat. MGM High School, which is one of the targeted school under the programme, falls in the coastal area where is designated as the danger zone by NDMO.

Table: 4.1 Activities list of earthquake drill in Suva, Fiji

	<b>Activity</b>	<b>Involved</b>
Activity 1	Setting Up Evacuation Plan - Hierarchy Chart and Roles and Responsibilities	Teachers Administrators
Activity 2	Checking Evacuation Procedure for Emergency Situations at School - - Fire Threat, Earthquake, Tsunami	Teachers Administrators Students
Activity 3	Conducting Earthquake Drill Immediate Threat and Moderate Threat	Teachers Administrators Students
Activity 4	Conducting Tsunami Drill - Tsunami Warning and Evacuation from School to nearest higher ground	Teachers Administrators Students Community
Activity 5	Checking Emergency Kit / First Aid Kit	Teachers Administrators Students Community

### Educational Material Development

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 Ms. Tauga, the educational expert 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.

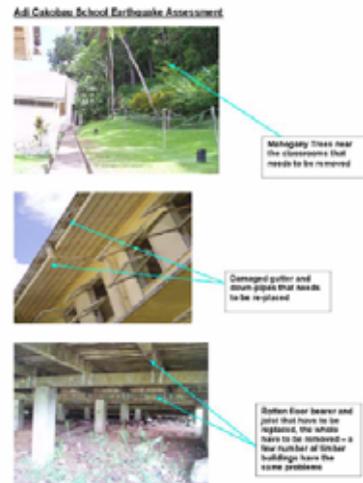
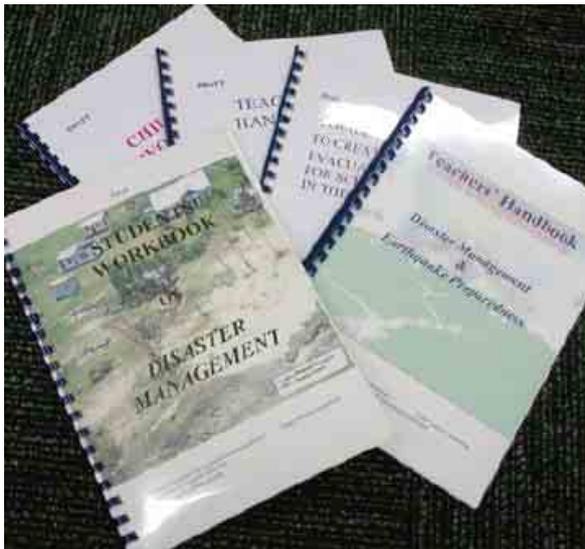


Figure 4.3 Educational manuals and Technical report developed in Fiji

### 4.1.3 Training and Capacity Building

One day Training workshop on safe housing and school construction was conducted using the draft manual of safe school construction as participant’s handbook. The training program received the comments from the participants on the suitability of the content, presentation of the material and overall evaluation. Technicians from ministry of education urged to make the manual as the national guideline for school construction. Following was the program of the training.

Table 4.2: Brief glimpse of training program in Suva, Fiji

<ul style="list-style-type: none"> <li>▪ Opening Remarks from NDMO, CATD, UNCRD and GRIPS</li> </ul>
<ul style="list-style-type: none"> <li>▪ <b>Introduction</b> of housing safety survey</li> <li>▪ <b>Questionnaire</b> fill up on housing earthquake safety issue by trainee</li> </ul>
<ul style="list-style-type: none"> <li>▪ <b>Lecture:</b> Earthquakes, floods, cyclones in Fiji,</li> <li>▪ <b>Discussion:</b> 1952 earthquake and tsunami and other past earthquakes</li> </ul>
<ul style="list-style-type: none"> <li>▪ <b>Lecture:</b> -How does building behave in earthquakes               <ul style="list-style-type: none"> <li>- Design and construction principles for earthquakes</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li><b>Lecture:</b> earthquake deficiencies of wooden, masonry and RC building</li> </ul>
<ul style="list-style-type: none"> <li>▪ <b>Lecture:</b> Location of building site, Building plan for earthquakes, Architectural issues</li> <li>▪ <b>Exercise :</b>DO’s and Don’t DO’s</li> </ul>
<ul style="list-style-type: none"> <li><b>Lecture:</b> Eq resistant Timber frame structure</li> </ul>
<ul style="list-style-type: none"> <li><b>Lecture:</b> Eq resistant masonry and RC structure</li> </ul>
<ul style="list-style-type: none"> <li><b>Lecture:</b> seismic retrofitting principle and method for wooden, masonry and RC houses</li> </ul>
<ul style="list-style-type: none"> <li>Lecture: repair and maintenance log and method</li> </ul>
<ul style="list-style-type: none"> <li><b>Exercise:</b> Multiple choice question</li> <li><b>Questionnaire:</b> Re-survey of carpenters on earthquake safety of houses</li> <li><b>Feedback:</b> Guideline content and present</li> </ul>
Closing Remarks <ul style="list-style-type: none"> <li>- Representative of participant</li> <li>- NDMO, CATD, GRIPS and UNCRD</li> </ul>

## Training Manual Development

Training Manual for Technicians has been developed by Training Expert, Mr. Robert Pole and Mr. Josefani Bola, the director of CATD. The content of the training manual are:

### 1.0 Background

### 2.0 Earthquakes

- 2.1 Causes of Earthquakes
- 2.2 Earthquake Prone Areas
- 2.3 Damages Caused by Earthquakes
- 2.4 Structures at Risk
- 2.5 How to Minimize Effects of Earthquakes on Structures
- 2.6 Retrofitting School and Similar Public Buildings
  - a. Inspection and Assessment
  - b. Problems and Solutions
- 2.7 Safe Building Construction Practices
  - Timber Framed Buildings
  - Masonry Buildings

### 3.0 School Building Maintenance Programme

### 4.0 Institutional Arrangement

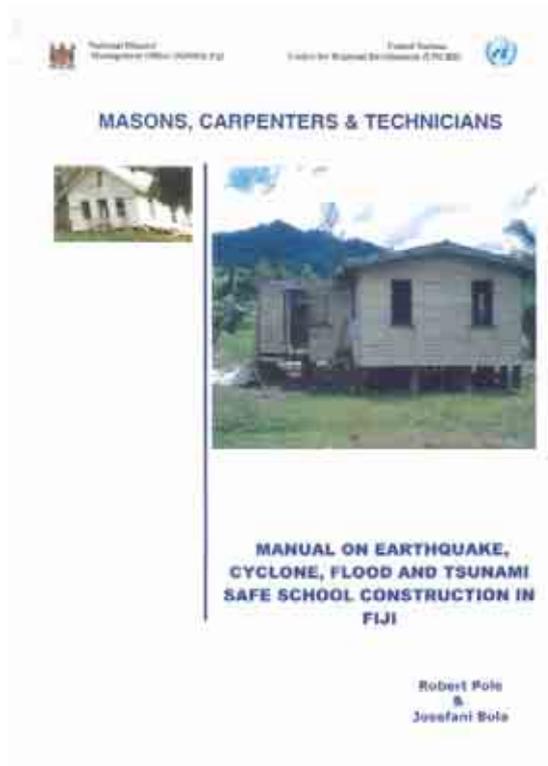


Figure 4.4 Guideline for Experts and Posters for the Public (Fiji)