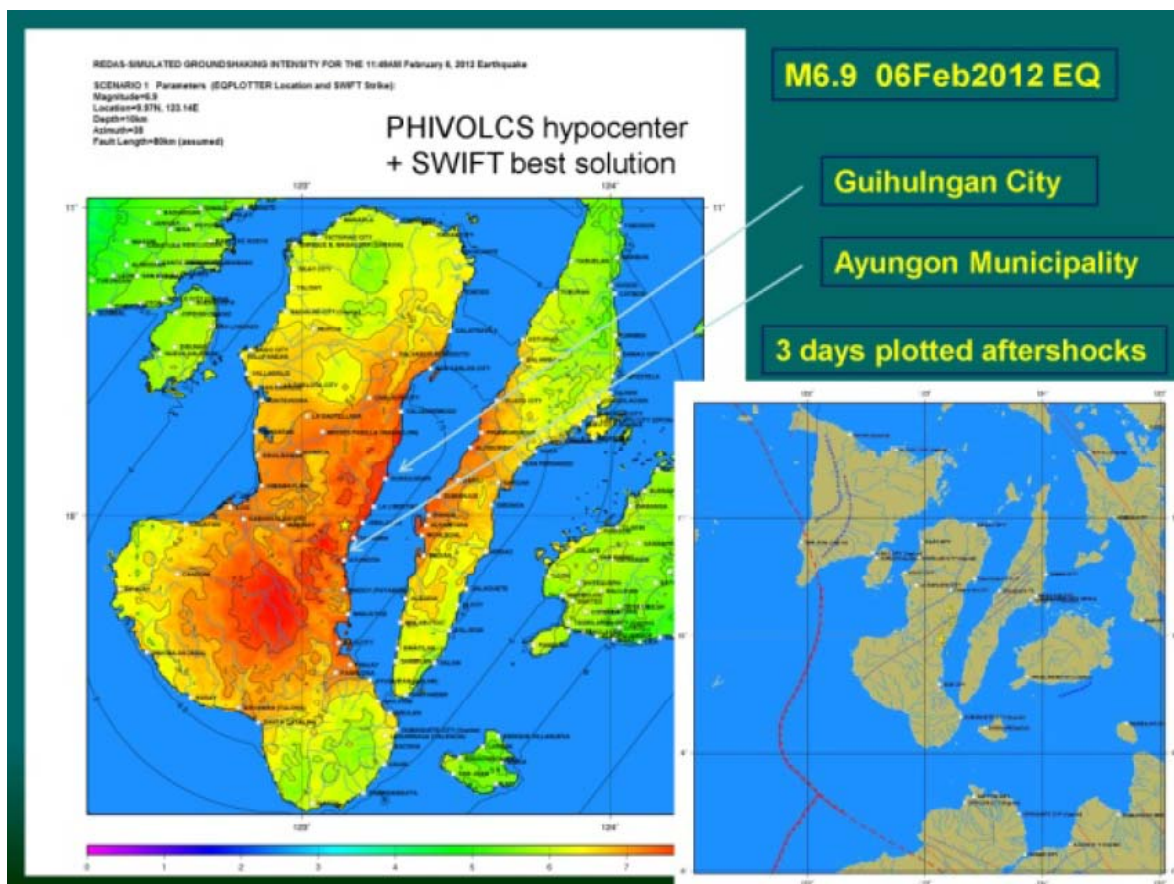




# Approach to Enhance Awareness of Earthquake Risks With a Full-scale Shaking Table Test in the Philippines

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# Effects of Effects of Magnitude 6.9 Earthquake in Negros Oriental

## DAMAGED HOUSES

16 February 2012, 6:00 AM

| REGION      | Province/Municipality | DAMAGED HOUSES |           |
|-------------|-----------------------|----------------|-----------|
|             |                       | TOTALLY        | PARTIALLY |
| GRAND TOTAL |                       | 14,432         |           |
|             |                       | 6,366          | 8,066     |
| Region VII  | Sub-Total             | 6,366          | 8,066     |
|             | NEGROS ORIENTAL       | 6,366          | 8,066     |
|             | Ayungon               | 536            | 2,330     |
|             | Bindoy                | 63             | 917       |
|             | Jimalalud             | 4,153          | 1,826     |
|             | Vallehermoso          | 19             | 21        |
|             | Tayasan               | 590            | 1,216     |
|             | La Libertad           | 886            | 1,232     |
|             | Manjuyod              |                | 1         |
|             | Guihulngan City       | 114            | 146       |
|             | Bais City             |                | 2         |
|             | Cebu City             | 5              | 375       |

Source:  
NDRRMC website

| AFFECTED AREAS |     |
|----------------|-----|
| REGIONS        | 1   |
| PROVINCES      | 2   |
| CITIES         | 2   |
| MUNICIPALITIES | 8   |
| BARANGAYS      | 174 |

|         |       |  |
|---------|-------|--|
| Dead    | : 43  | 18-Guihulngan; 8-Jimalalud; 3-Tayasan; 1-Bindoy; 2-Manjuyod; 2-Ayungon; 9- La Libertad                 |
| Injured | : 112 | 7 Reg VI (Negros Occidental)<br>105 Reg VII (85-Guihulngan; 6-La Libertad; 13-Tayasan; 1-Vallehermoso) |
| Missing | : 63  | 26-Guihulngan; 37-La Libertad  |



Impact to structures





Typical residential house

Light material dwelling



Effect to single  
timber post cottages

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Typical  
observation  
to details

6



**No structural damage**



**RC day care center**



**Small RC cottage**



**Two storey Timber and Bamboo Resthouse**



**Two storey residence**

**residents stay in the open most of the day for more than a week after the event**



**Clueless of the hazards and impacts, regular daily activities are disrupted**



Residents prefer to sleep in the open despite structural soundness of their house



## Lessons learned:

- Strict implementation of Building Standards (National Building Code, National Structural Code of the Philippines, etc.) and zoning requirements.
- Establishment of short, medium, and long term preparedness plan for the community and facilities.
- Preparation of an aggressive and practical earthquake preparedness measures such as earthquake drills, information campaigns, activation/strengthening of disaster/emergency units, etc.



## Damaged CHB Masonry Houses subjected to a 100% Kobe EQ(1D)

PHIVOLCS-JICA/JST Project 24Feb2011



Video presentation of actual performance in an earthquake of code-compliant and non-compliant structures/residential houses as a tool to enhance awareness

## PHIVOLCS - JST-JICA (SATREPS) Project Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information in the Philippines

Under Component 4:  
Provision of Disaster Mitigation and Promotion of Utilization

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■ Development of practical tools for houses

## ■ Development of practical tools for houses

### Objectives:

The first step to disaster reduction is to understand the risk. In order to attain an effective earthquake disaster reduction, it is critical that the stakeholders such as **government officials, contractors, workers, community leaders, and house owners clearly** understand the earthquake risk, or damage potential of their house, community and city.

To promote earthquake disaster mitigation one must realize:

- (1) the earthquake risk as their own problem, and
- (2) The needed action as their own task  
(with technical assistance from the professionals).

## ■ Development of practical tools for houses

### Objectives:

These practical tools shall

- (1) raise awareness among the stakeholders,
- (2) **evaluate in a simplified way the safety/vulnerability of houses as well as an Educational tool.**

> The purpose is to raise awareness but not to provide very accurate estimate.

> The programs of the tools could be rough, omitting some minor factors.

## ■ Development of practical tools for houses

### Practical tool #1 (STEP1)

#### 1. "Let's check your house" Questionnaire

Following several questions (up to 10) concerning shape of the floor, wall openings, foundation type and condition, roof, age, etc., users

- (1) can estimate the safety/vulnerability of their houses, and
- (2) can understand which component of the house are important for safety.

User: House owner

Medium: Paper, Web

Target: CHB masonry structure, Wooden structure,  
(1-2story building)

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## ■ Development of practical tools for houses

### Practical tool #2 (STEP2)

#### 2. Software to evaluate safety/vulnerability of houses

Focusing on the CHB masonry structure, a practical tool to

- (1) understand and evaluate the safety/vulnerability of the house and
- (2) help acquire relevant knowledge for retrofitting

shall be developed.

With the input of ground condition, foundation, floor plan, wall dimension, roofing, reinforcement, age, etc. this tool will

- (1) show the weaknesses/vulnerability of the design, and
- (2) how to improve the safety of the house against earthquakes

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## ■ Development of practical tools for houses

### Practical tool #2 (STEP2)

#### 2. Software to evaluate safety/vulnerability of houses

A computer simulation program shall be developed based on the data from the field, experimental data and NSCP.

A visual and user-friendly interface shall also be developed, so that any user (house owner) with the assistance of an engineer can use this tool. The output shall include (1) the scoring of the house, (2) the vulnerability, and (3) suggestions to strengthen the house.

User: House owner with Engineer

Medium: Personal Computer

Target: CHB masonry structure, Wooden structure?,  
(1-2-3?story building)



*...damage to a destructive earthquake  
will be greatly minimized !*



*...thank you !*