

Earthquake Risk Assessment of Mandalay City, Myanmar

Presented by

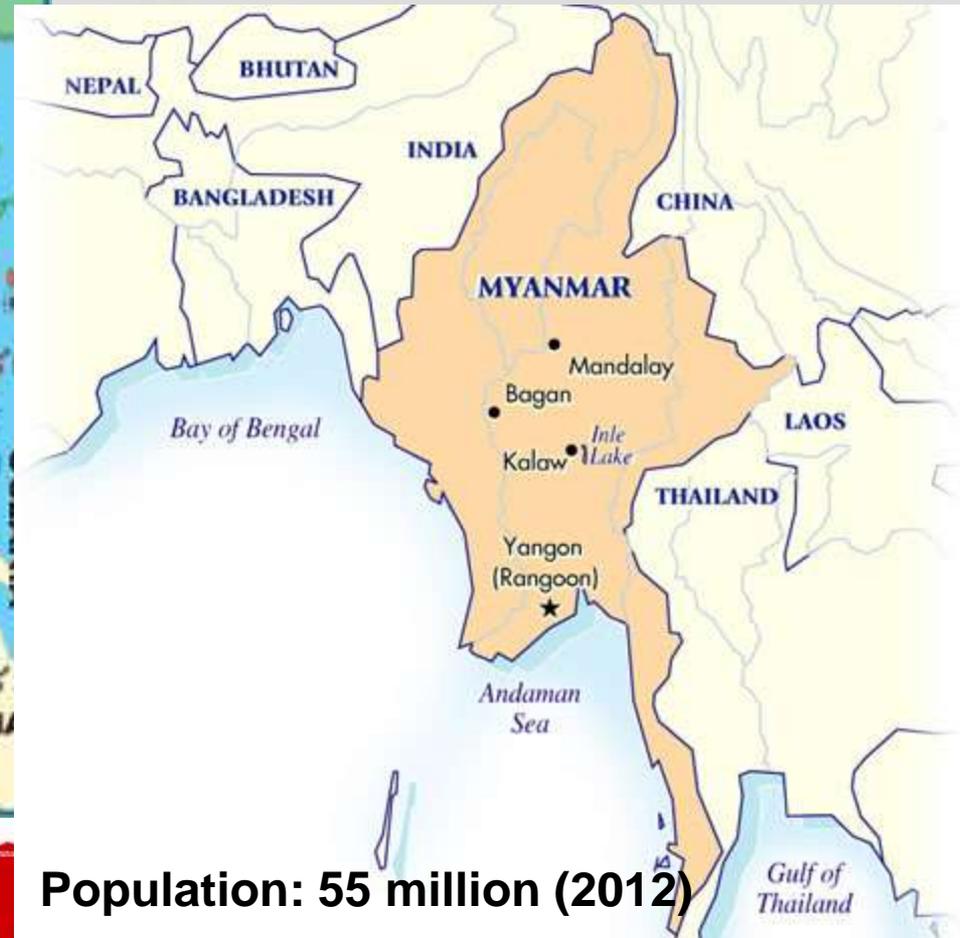
Peeranan Towashiraporn

Asian Disaster Preparedness Center

Understanding Risk Forum 2012

July 3, 2012

Where is Myanmar?



Population: 55 million (2012)

Why do we study earthquakes in Myanmar?

Destructive earthquakes have happened in Myanmar and tectonic evidences show that they will happen again in the future. The consequences of a major earthquake in urban areas now could be devastating.



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Earthquake risk assessment will identify areas of potentially high seismic risk, which will allow national and local authorities to make plans to mitigate the risk, to allocate resources, and plan for emergency responses accordingly, ultimately leading to a safer community.



Steps

WP1

- Seismic Source Study

WP2

- Seismic Hazard Assessment

WP3

- Selection of Pilot City

WP4

- Site Amplification Study

WP5

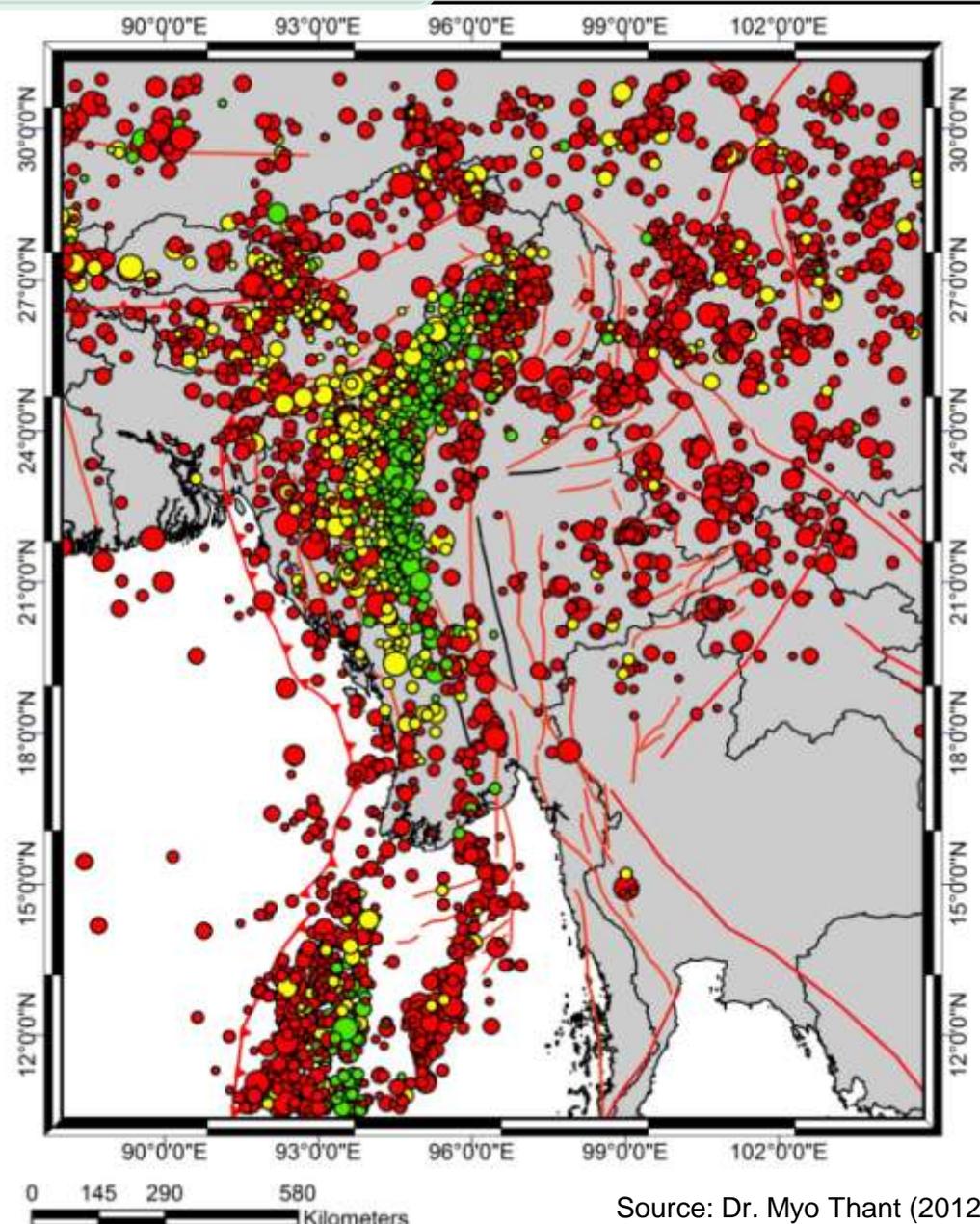
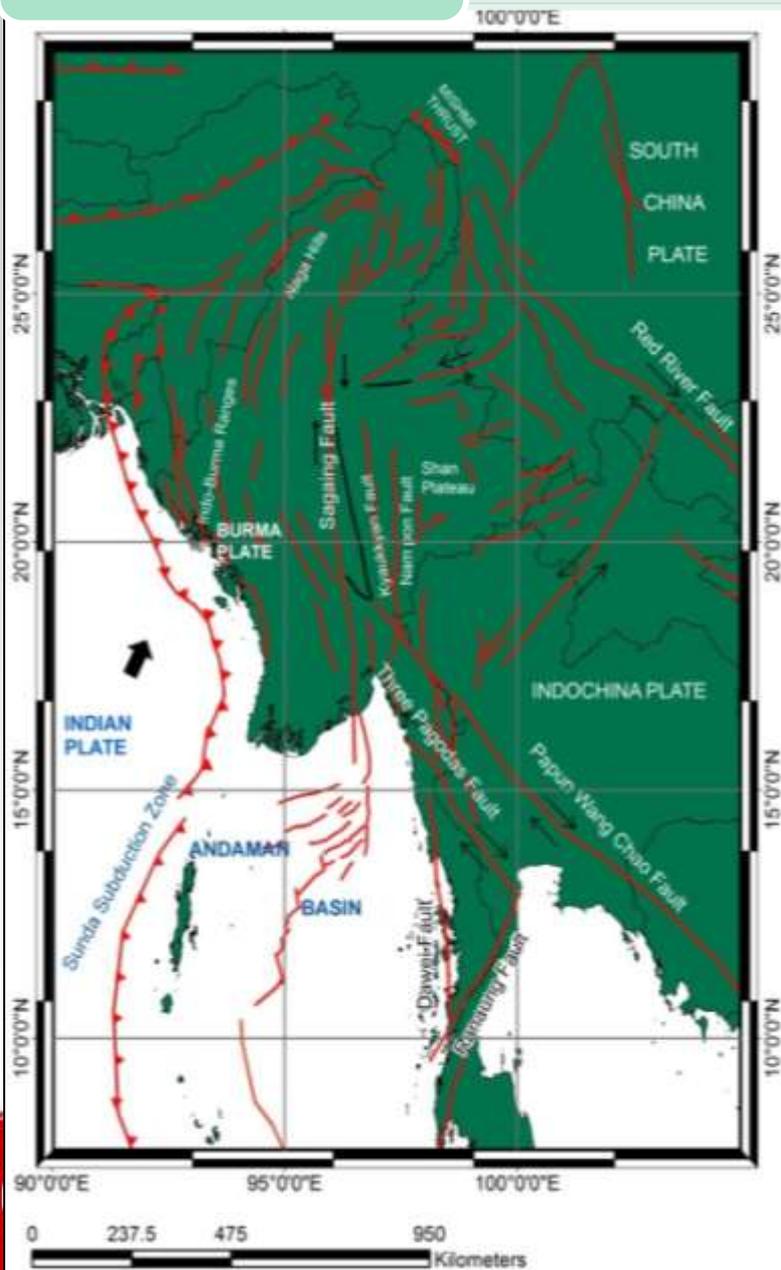
- Exposure and Vulnerability

WP6

- Damage Estimation

WP1

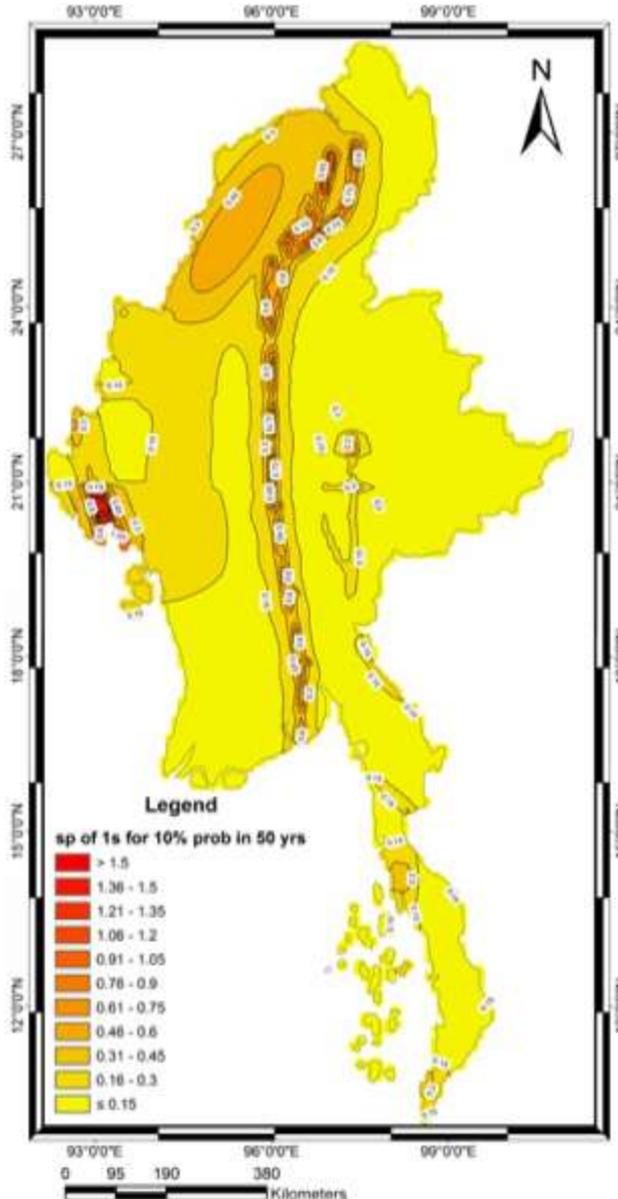
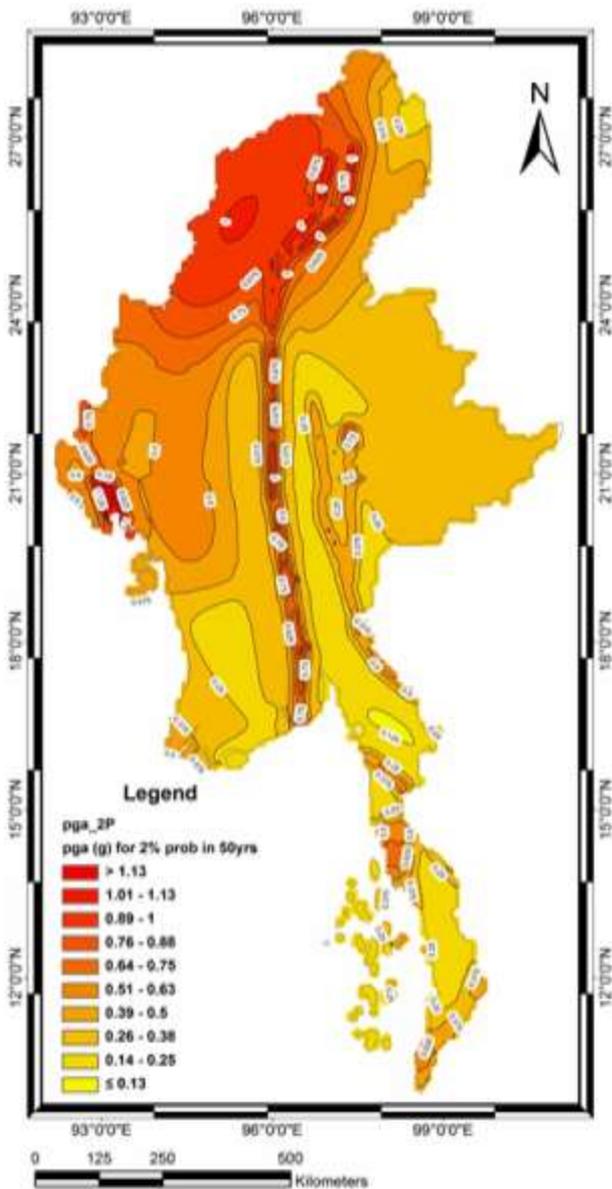
• Seismic Source Study



Source: Dr. Myo Thant (2012)

WP2

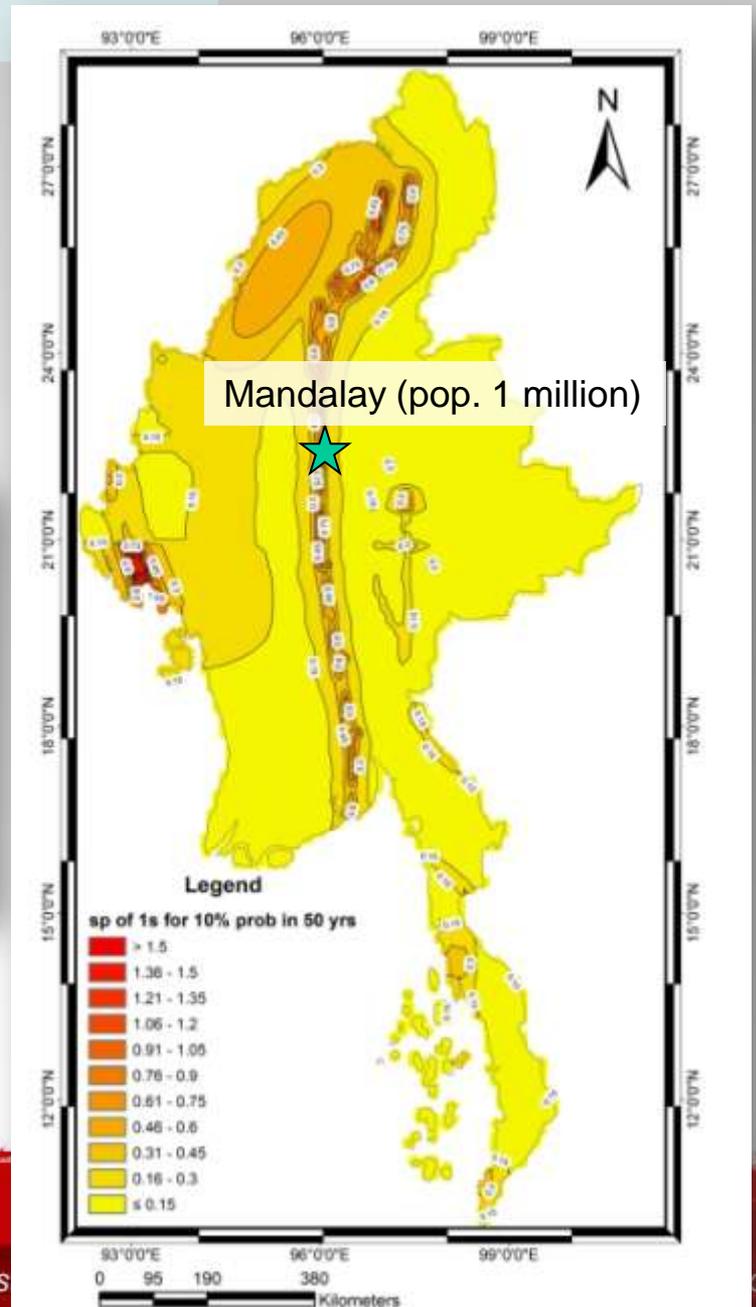
• Seismic Hazard Assessment



Seismic Hazard
Maps for **PGA**,
SA0.3, **SA1**, **PGV**
(10% and 2%
Probabilities of
Exceedance in 50
years)

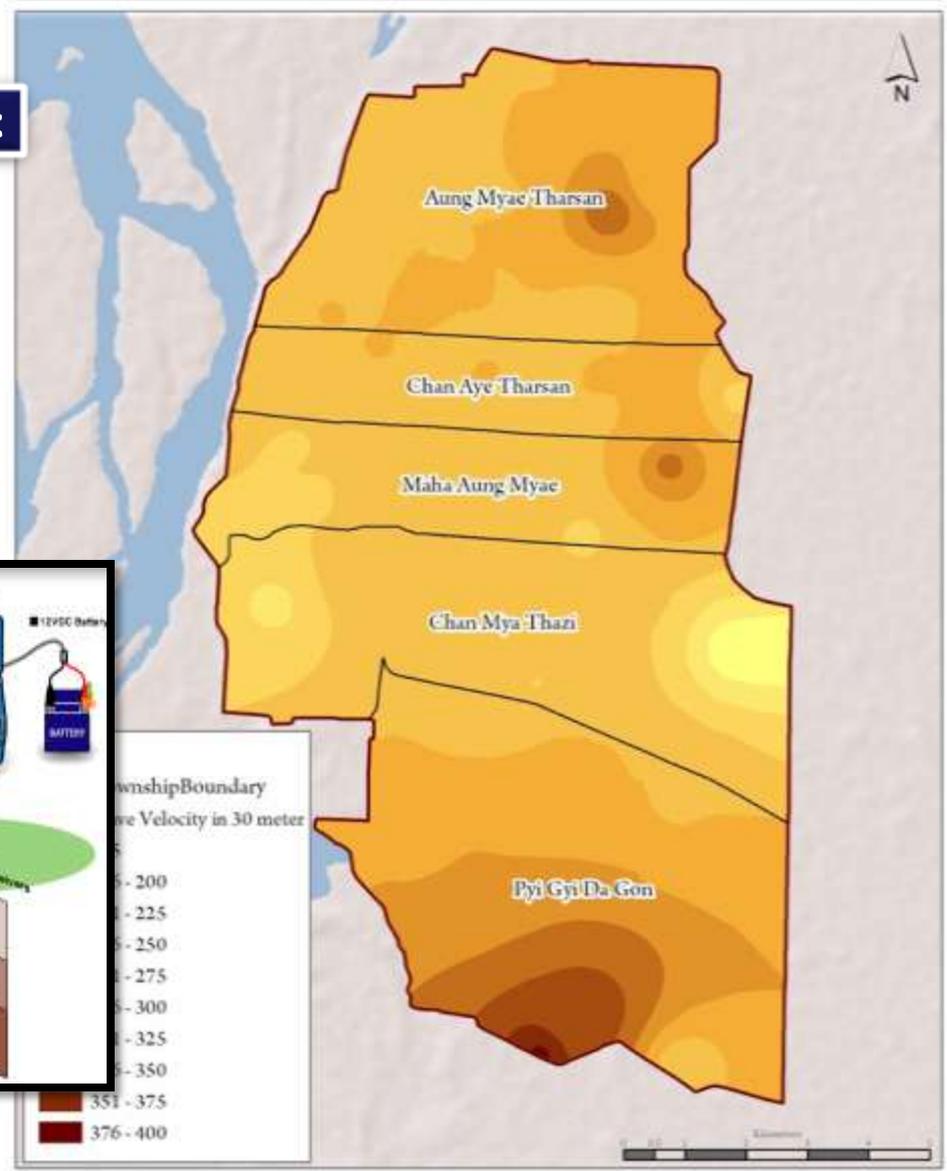
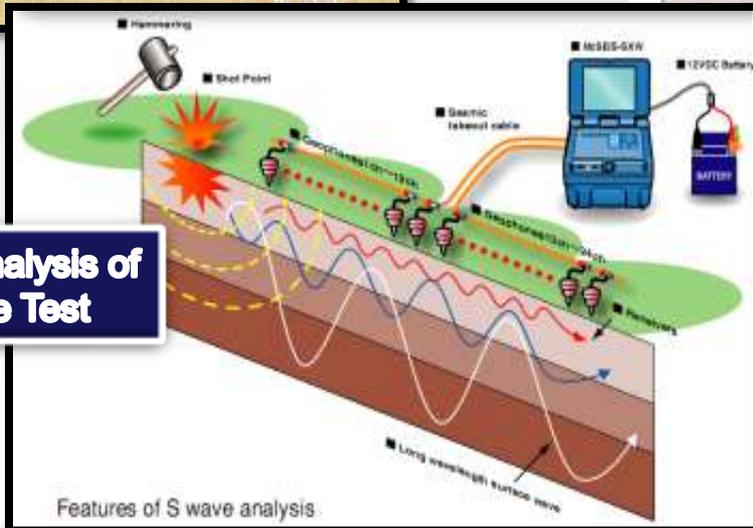
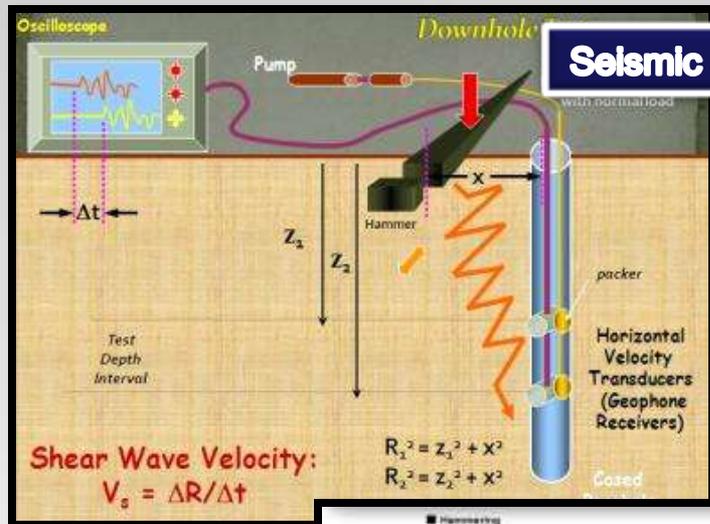
WP3

• Selection of Pilot City



WP4

• Site Amplification Study



Required Data for General Building Stock

Ward-level Building Counts

Ward-level Population Data

available from city government

Building occupancy class

Number of occupants (day, night)

Structural types

Building Vulnerability Characteristics

Restoration of lifeline functionality

Not available,

To be developed from a series of comprehensive surveys of representative buildings

Field Survey Activities

Training



Interview & consultation



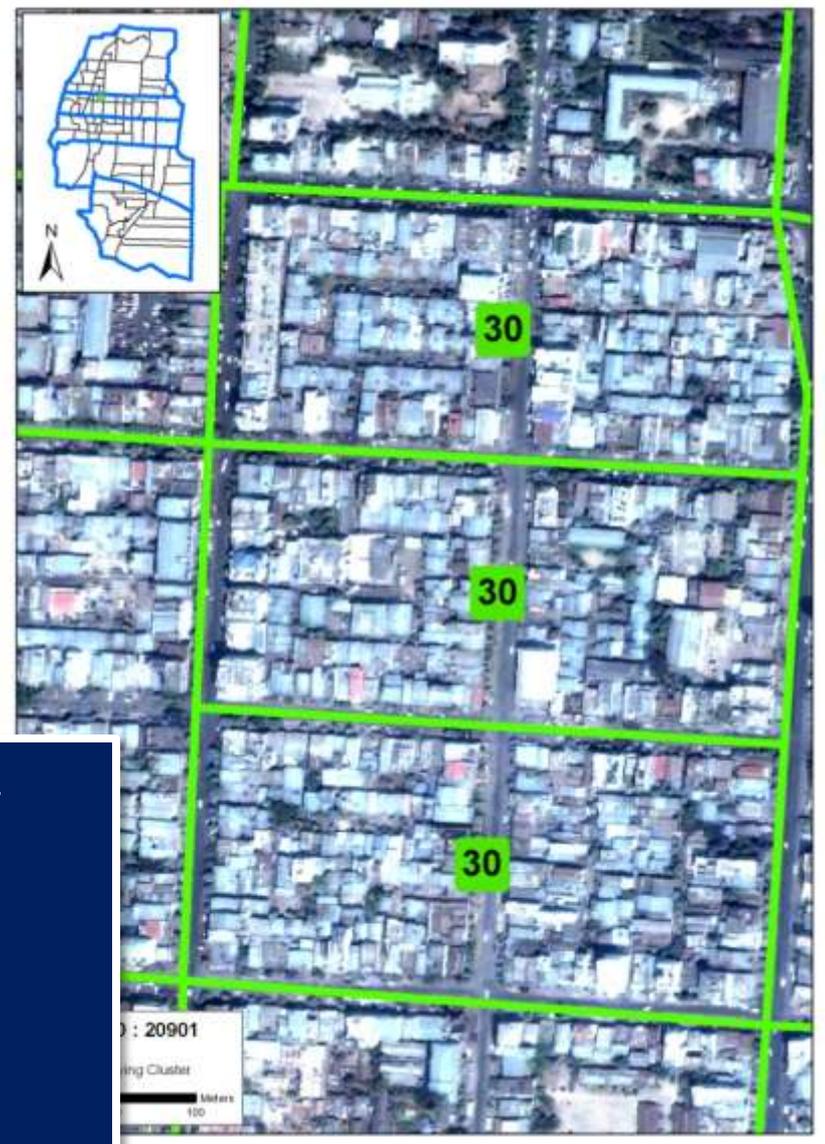
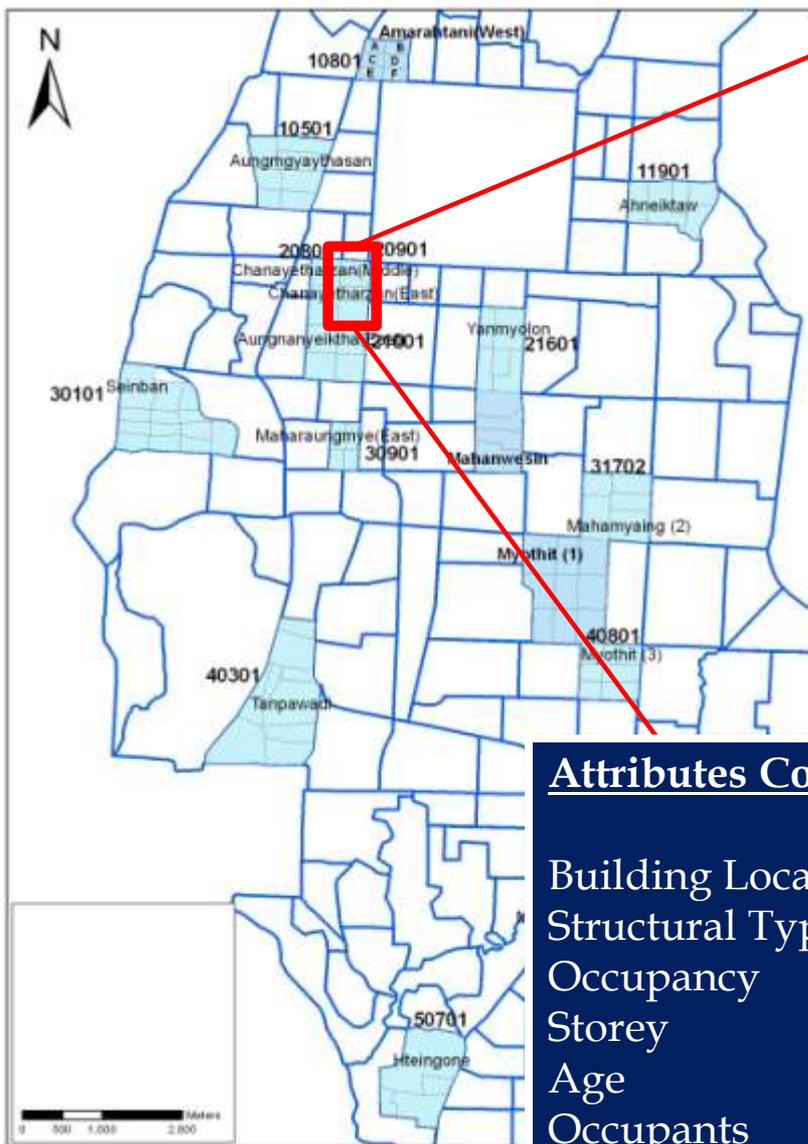
Discussion



Site survey



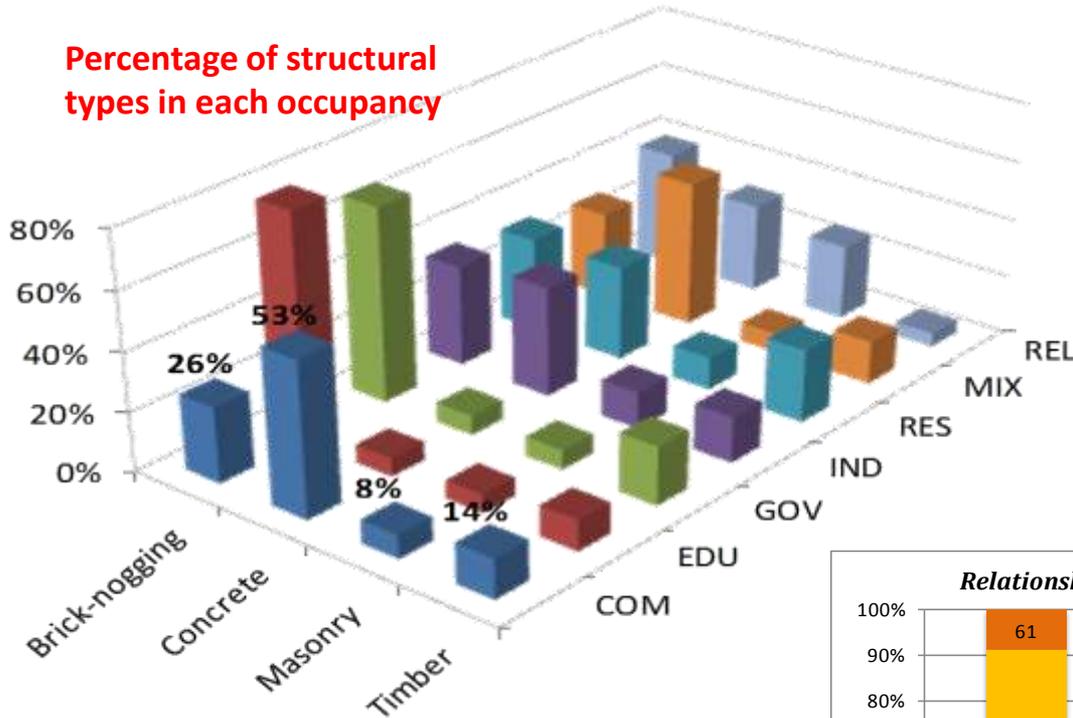
Participated by DMH, GAD, MES-Mandalay, and MCDC engineers



Attributes Collection:

- Building Location
- Structural Type
- Occupancy
- Storey
- Age
- Occupants
- Vulnerability Factors
- Physical Condition

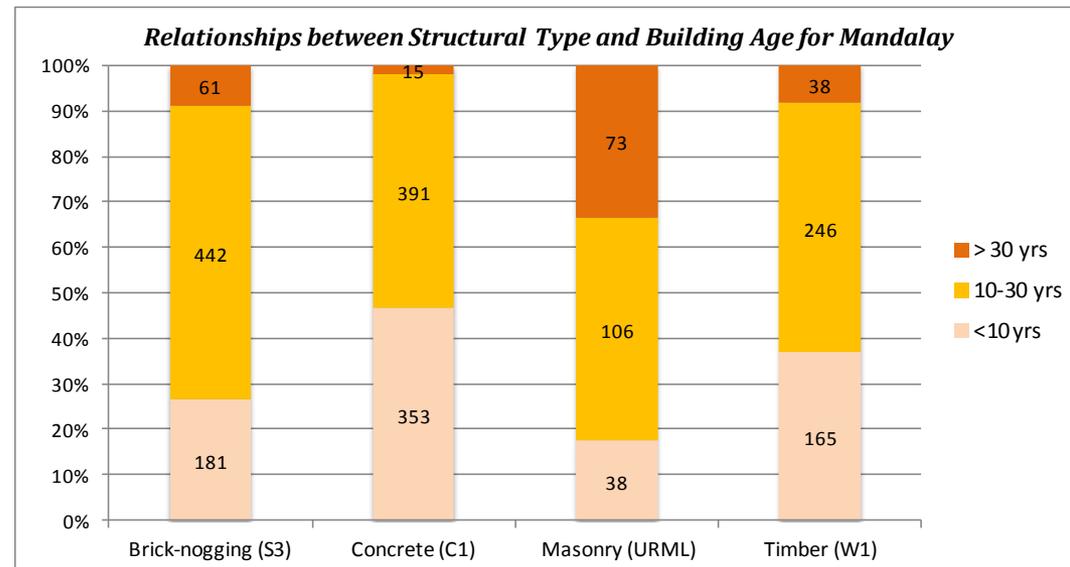
Percentage of structural types in each occupancy



Building Statistics

Data from 2,109 buildings in Mandalay

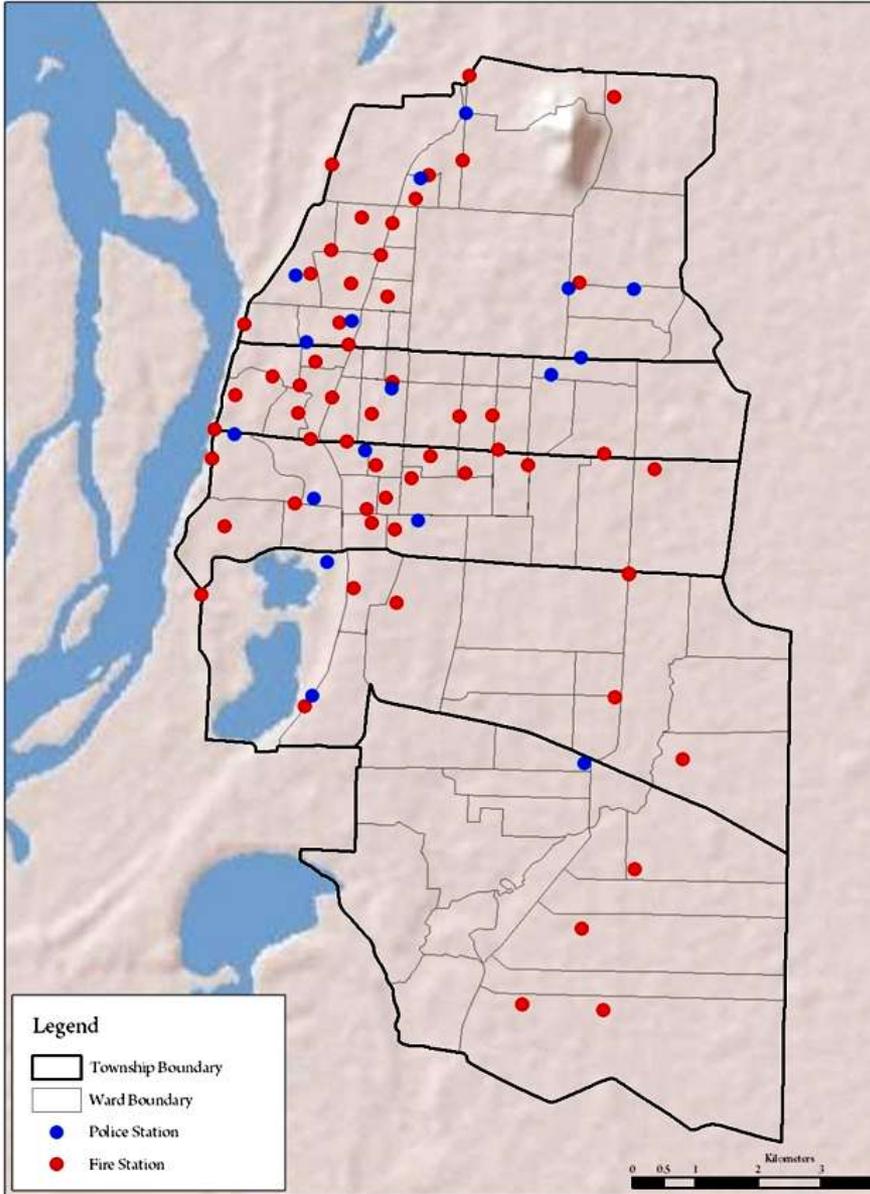
structural types and building ages





Fire & Police Station

Myanmar Earthquake Risk Assessment



Source : General Administrative Department (GAD), ADPC (field survey)

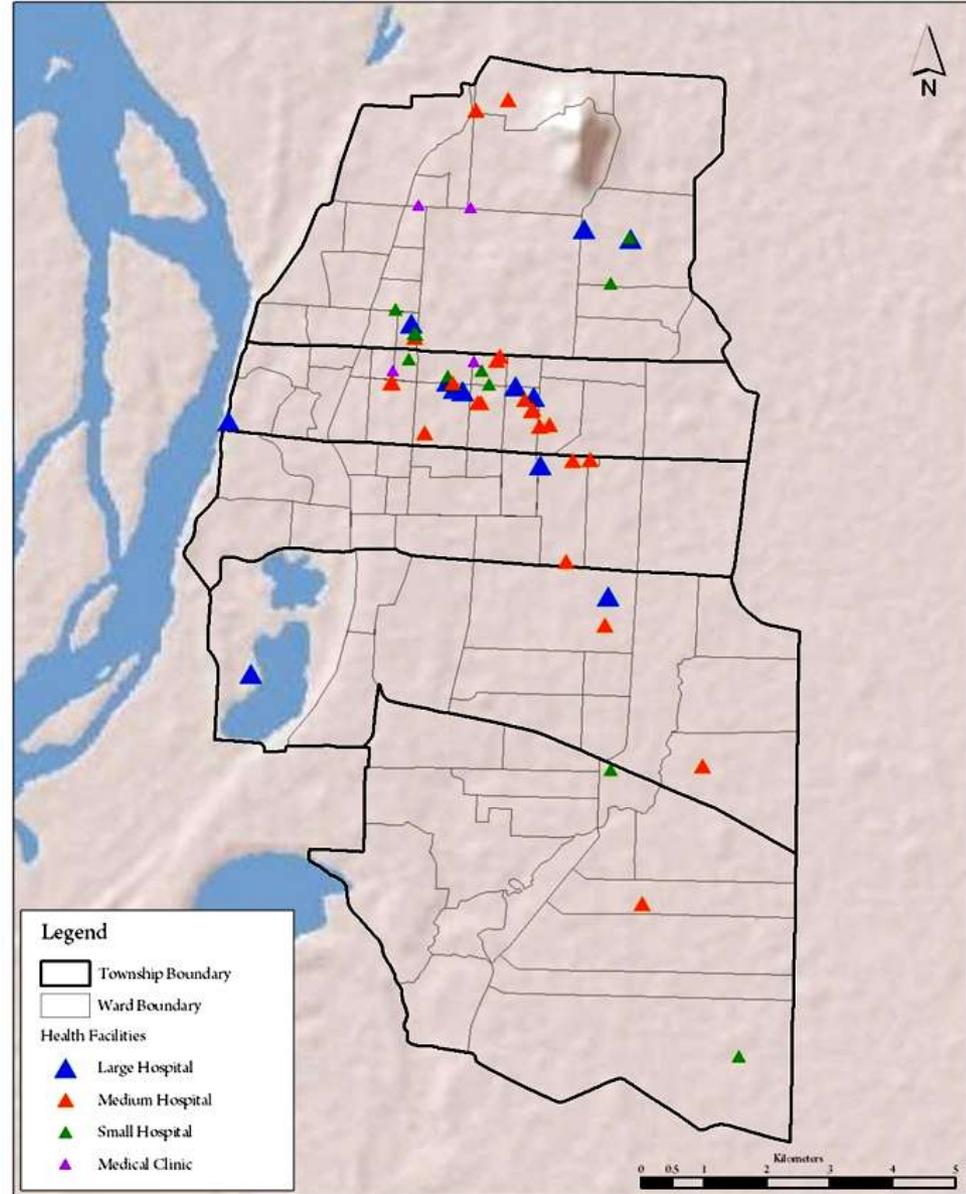
Disclaimer : Administrative boundary depicted in this map may not reflect reality on the ground.

Map creator



Health Facilities

Myanmar Earthquake Risk Assessment

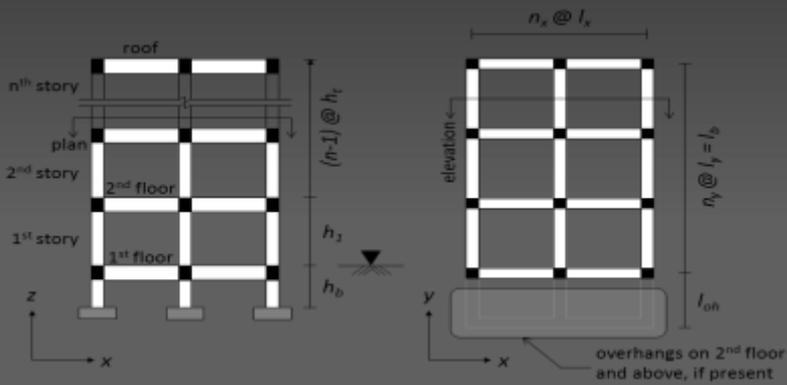
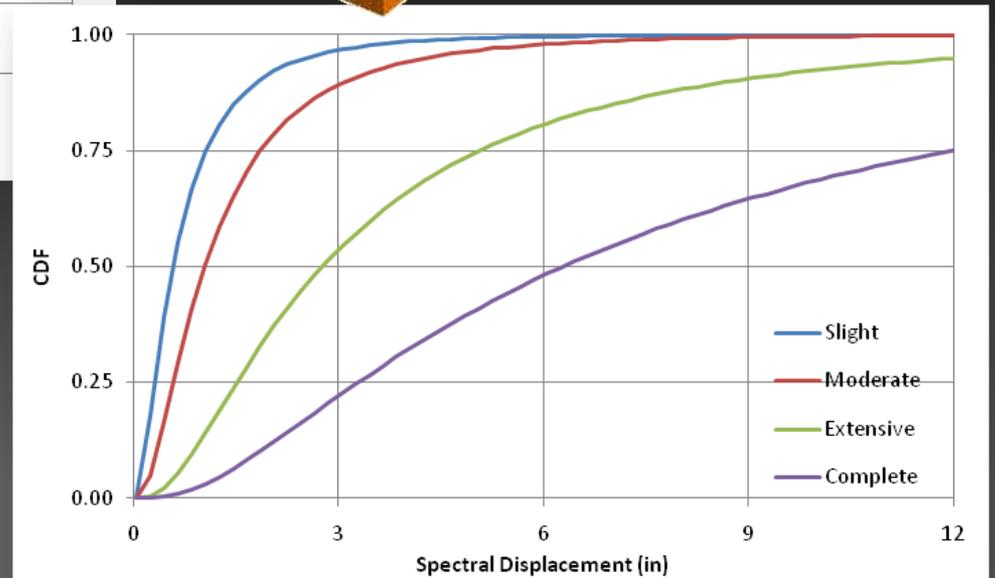
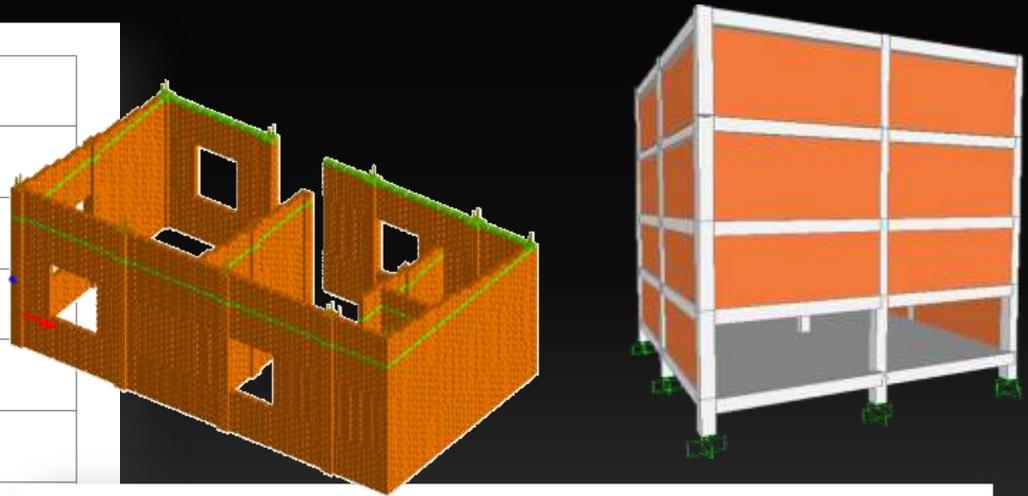
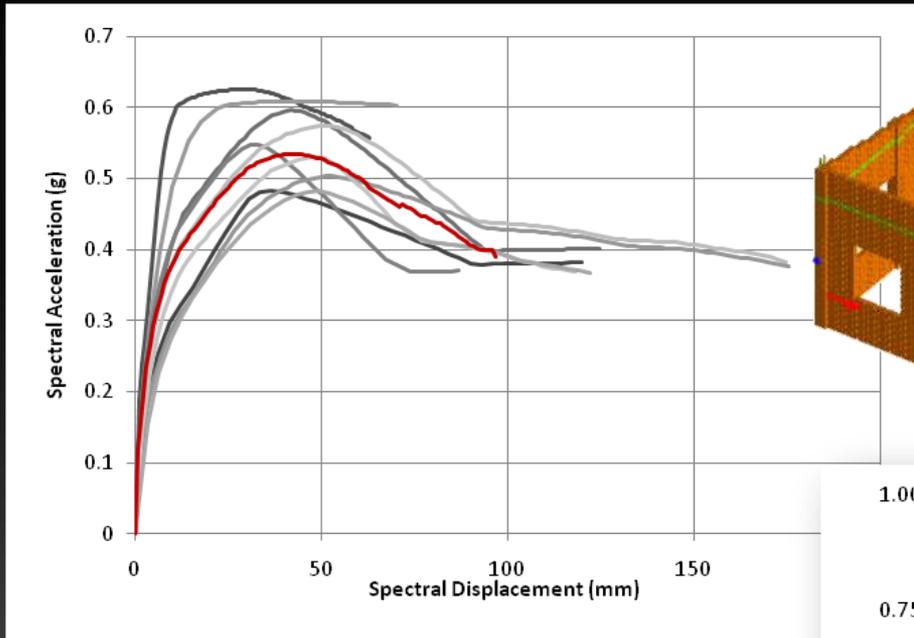


Source : General Administrative Department (GAD), ADPC (field survey)

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Map creation date: May 2012

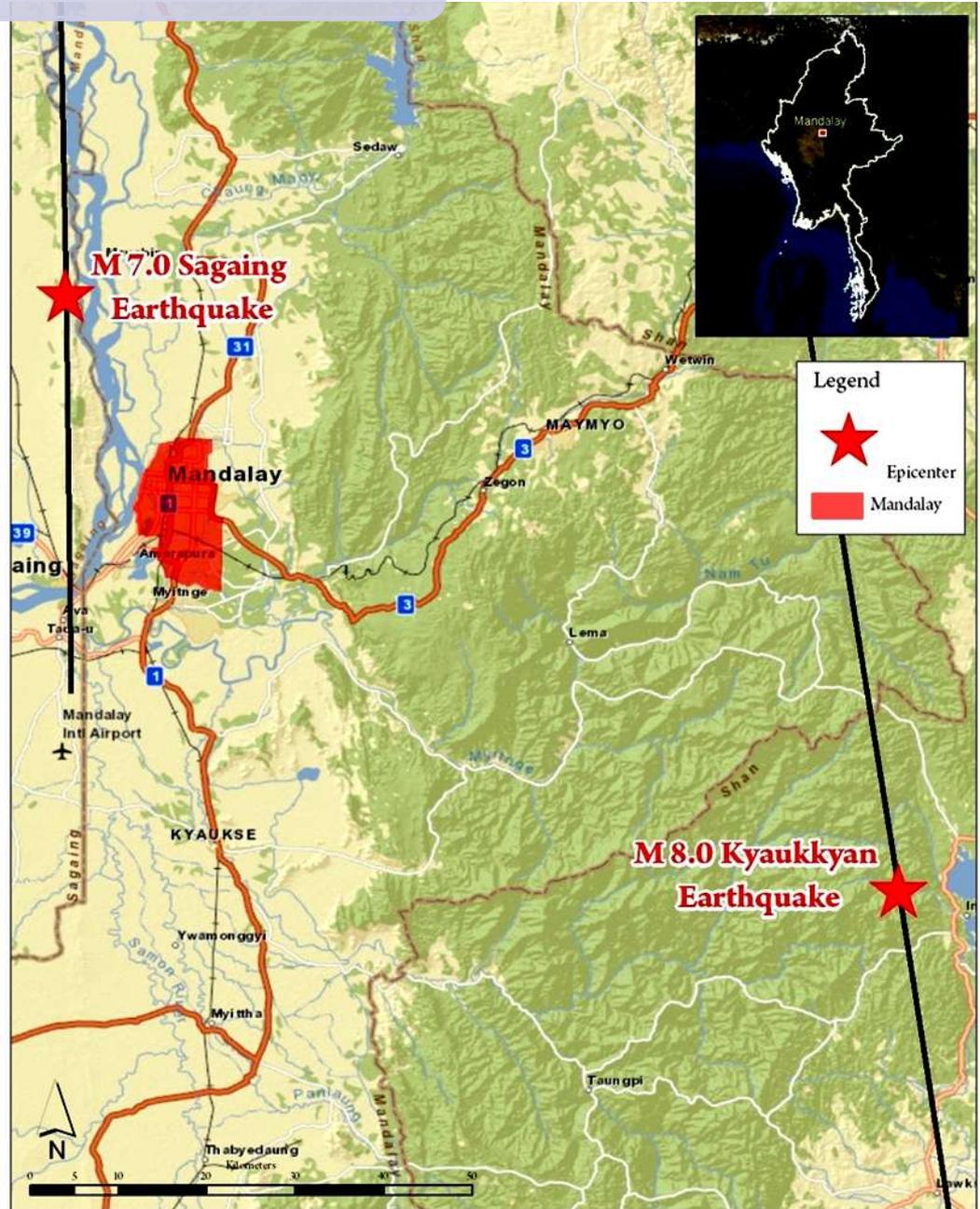
Seismic Fragility and Capacity Curves



Scenario Earthquakes

Sagaing Earthquake
 Moment magnitude = 7.0

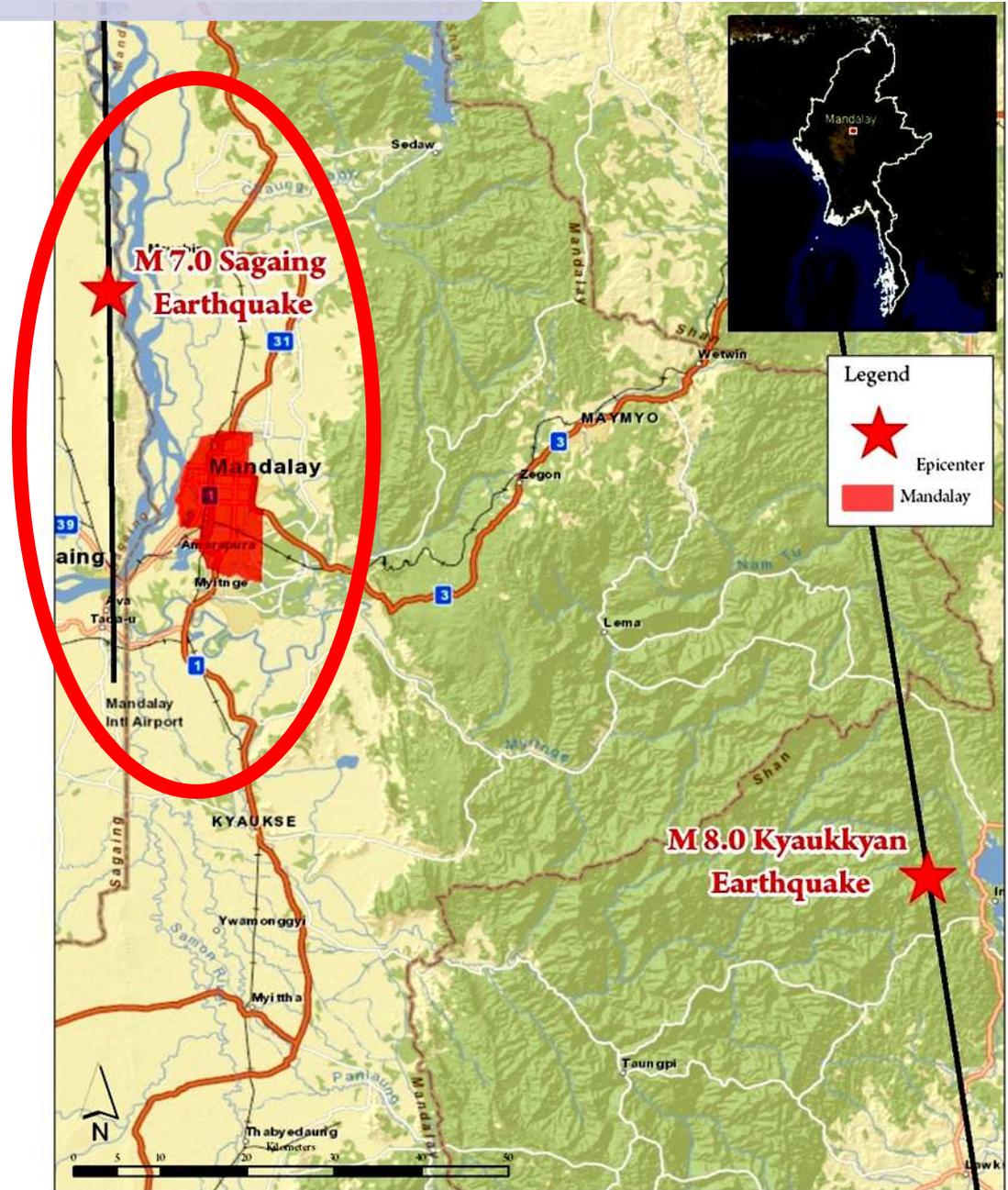
Kyaukkyan Earthquake
 Moment magnitude = 8.0



Scenario Earthquakes

Sagaing Earthquake
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Kyaukkyan Earthquake
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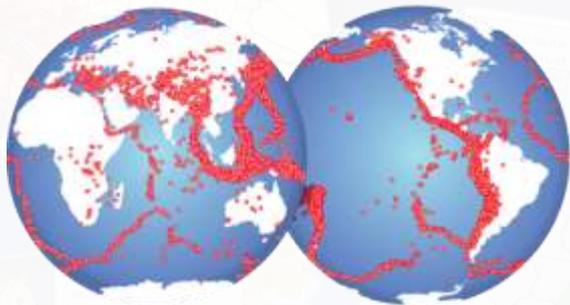
EARTHQUAKE



CAPRA

Probabilistic Risk Assessment Initiative

*FEMA's Software Program for
Estimating Potential Losses
from Disasters*



GEM

GLOBAL EARTHQUAKE MODEL



FEMA

FEDERAL EMERGENCY MANAGEMENT AGENCY



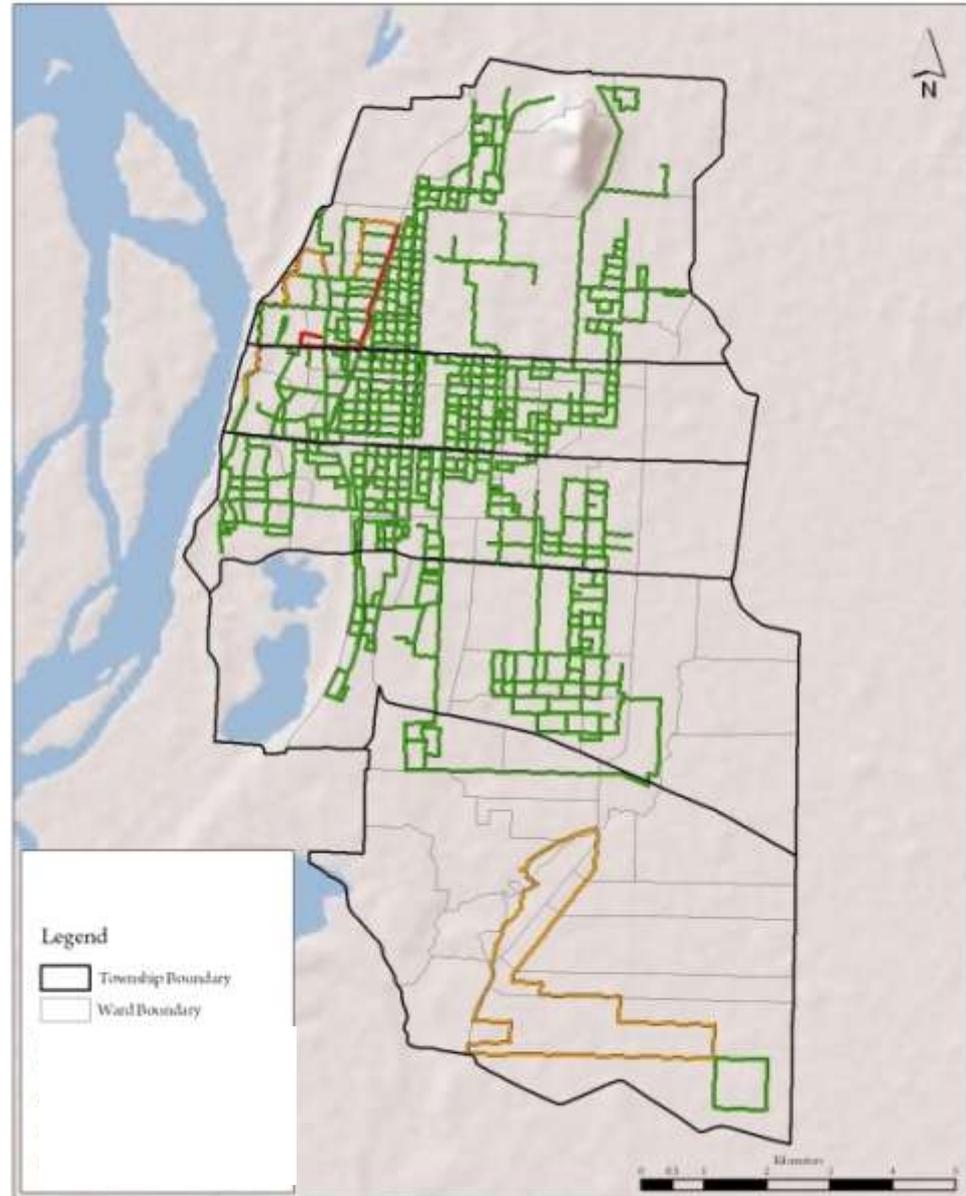
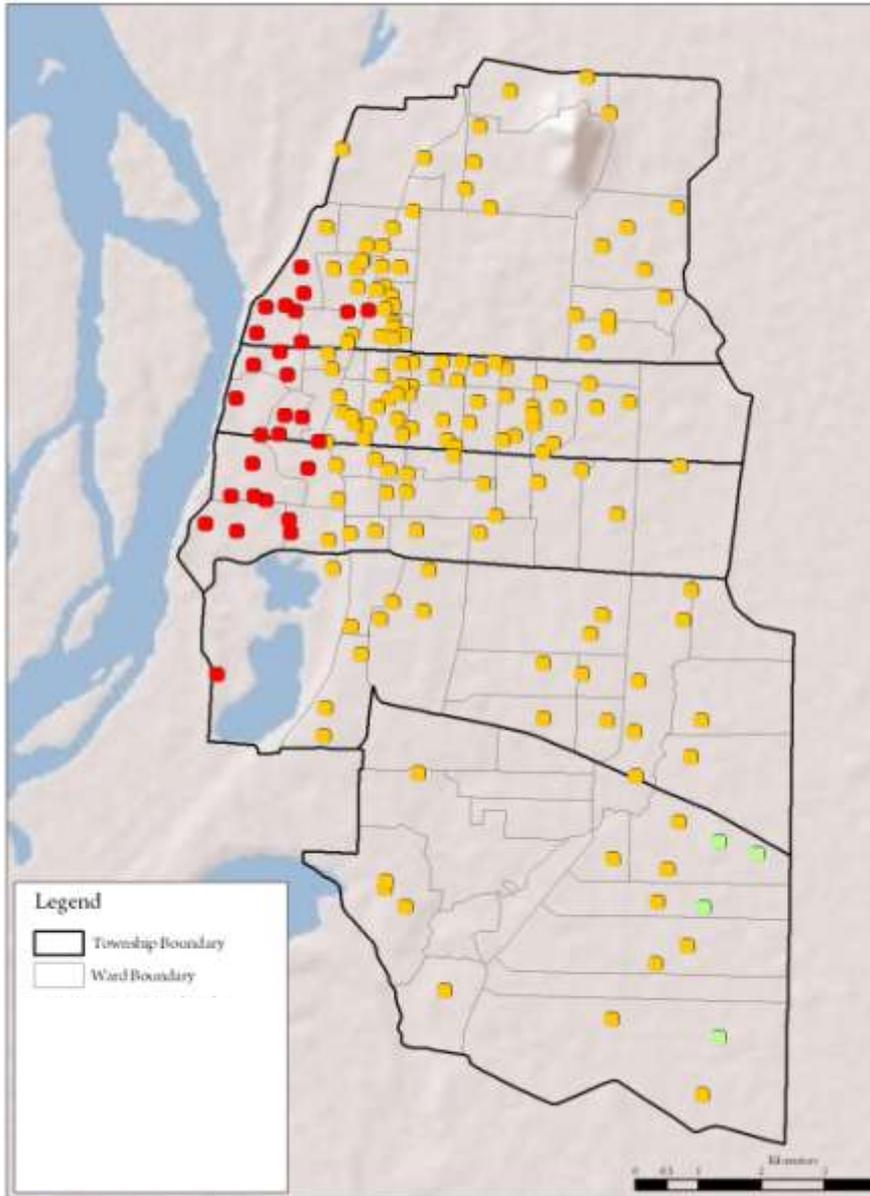
Education Facilities Damage

Myanmar Earthquake Risk Assessment



Potable Water Pipeline Damage

Myanmar Earthquake Risk Assessment



M7.0 Sagaing Scenario Earthquake

Utilization

- Risk-sensitive landuse planning in Mandalay
- City and household-level emergency response planning for Mandalay
- Retrofitting of at-risk buildings
- Awareness raising activities