

Integrating Statistics & Geospatial Information Earthquake Hazards & Risk Scenarios for Metro Manila

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DOST-PHIVOLCS

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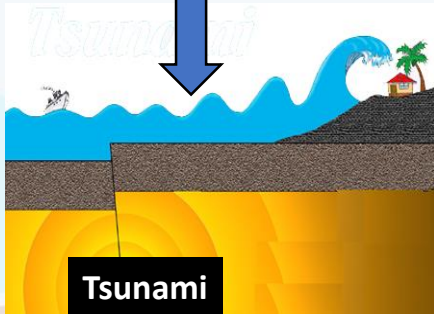
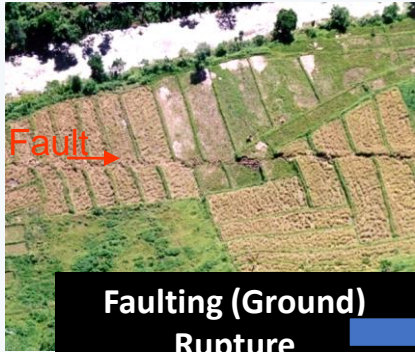
OUTLINE



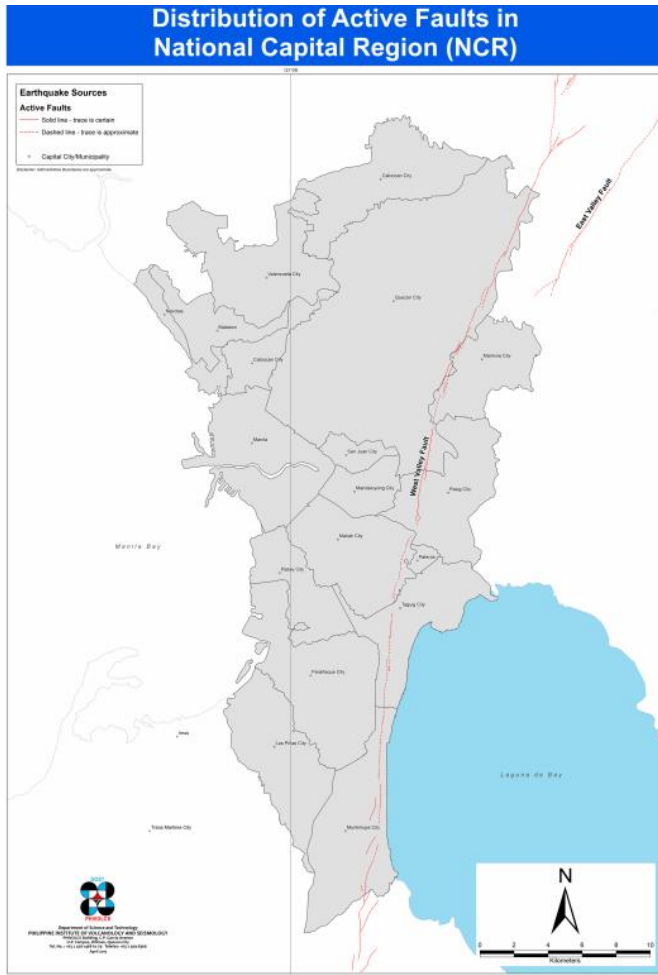
- I. Hazards & Risk
Scenarios for Metro
Manila
- II. Strategies Towards
Integration of Statistics &
Geospatial Information
- III. Ways forward

Hazards and Risk Scenarios for Metro Manila

EARTHQUAKE-RELATED HAZARDS



SURFACE FAULTING OR GROUND RUPTURE

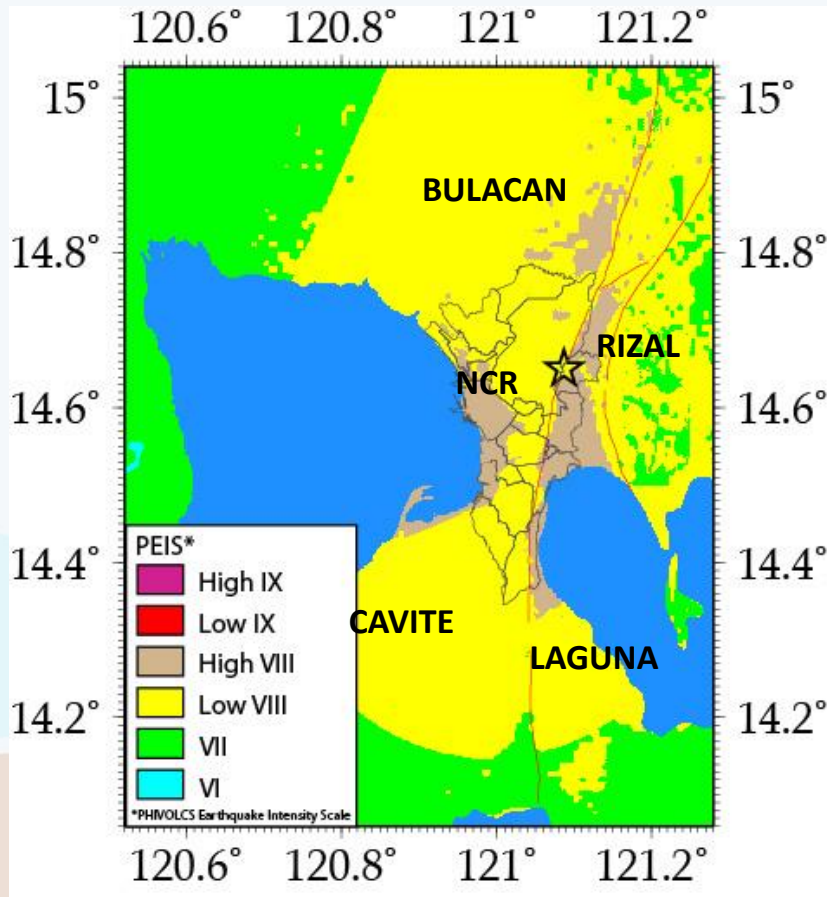


- Avoid construction of structures on top of an active fault; recommended buffer zone of at least 5 meters



GROUND SHAKING

M7.2 West Valley Fault Earthquake

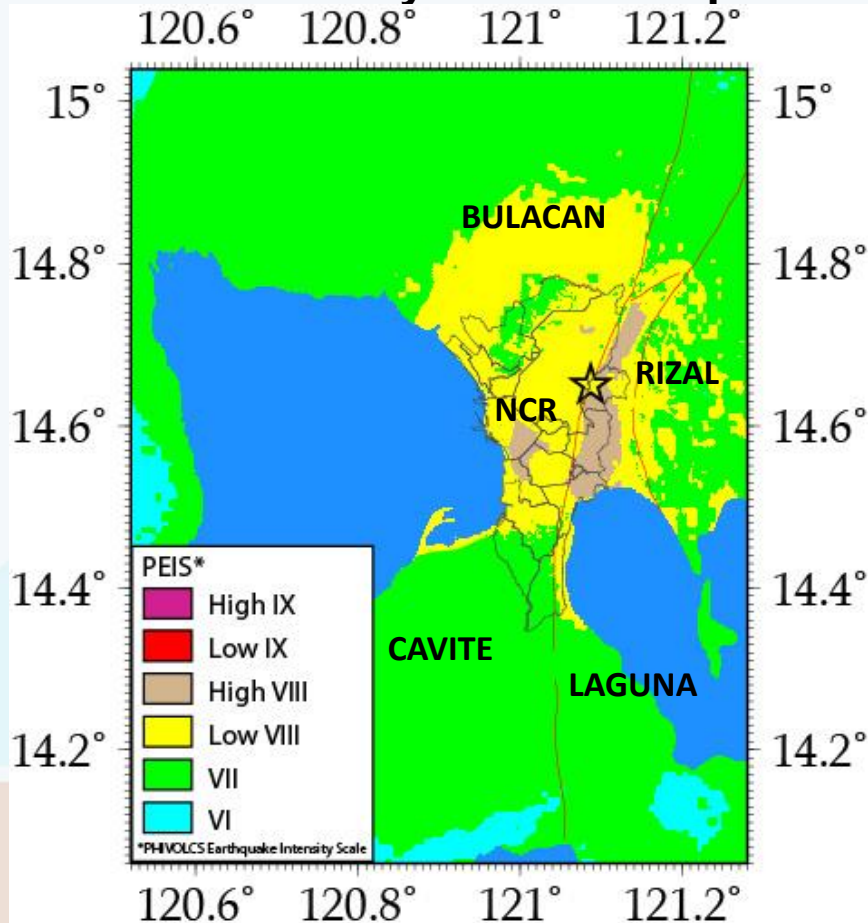


(Risk Analysis
Project, 2013)



GROUND SHAKING

M6.5 West Valley Fault Earthquake



(Risk Analysis
Project, 2013)



BUILDING AND CASUALTY ESTIMATES (2)

FOR METRO MANILA FROM A WEST VALLEY FAULT EARTHQUAKE

M7.2

M6.5

Total Floor Area in Complete to Collapsed Damage (sqm)		88,142,000	65,407,000
Total Floor Area in Slight to Extensive Damage (sqm)		172,924,000	162,799,000
Total Fatalities (Death)		31,000	23,000
Total Injuries	Very Serious	14,000	10,000
	Serious	112,000	85,171
	Slight	385,000	302,000
Total Economic Losses (millions of PhP)		2,269,000	1,773,000

LIQUEFACTION



Dagupan 1990

Subsidence of bridge column



Dagupan 1990

Subsidence of building, roads



Mindoro 1994

Fissuring of roads



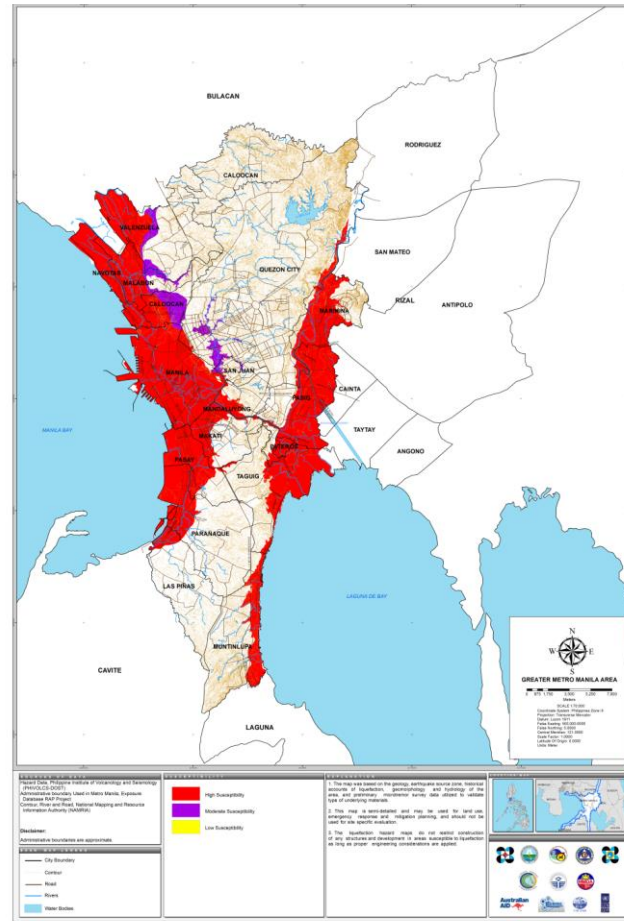
La Union, 1990

Damage to buried pipes, tanks



LIQUEFACTION POTENTIAL

M7.2 West Valley Fault Earthquake

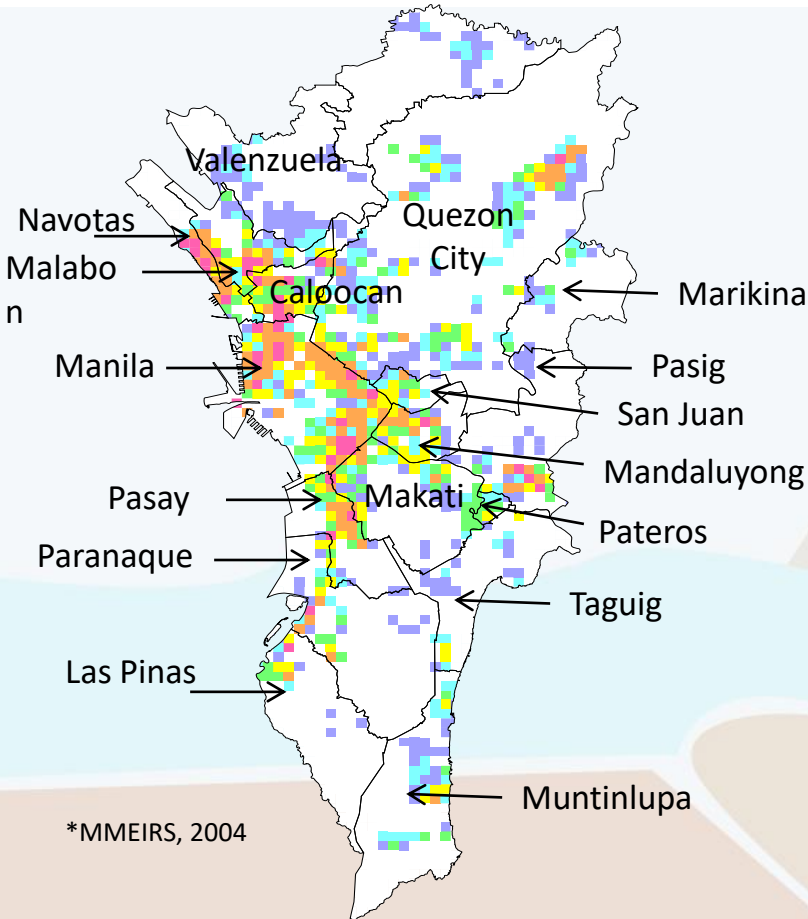


(READY for GMMA
Project, 2013)



FIRE AFTER THE EARTHQUAKE

M7.2 West Valley Fault Earthquake



*MMEIRS, 2004

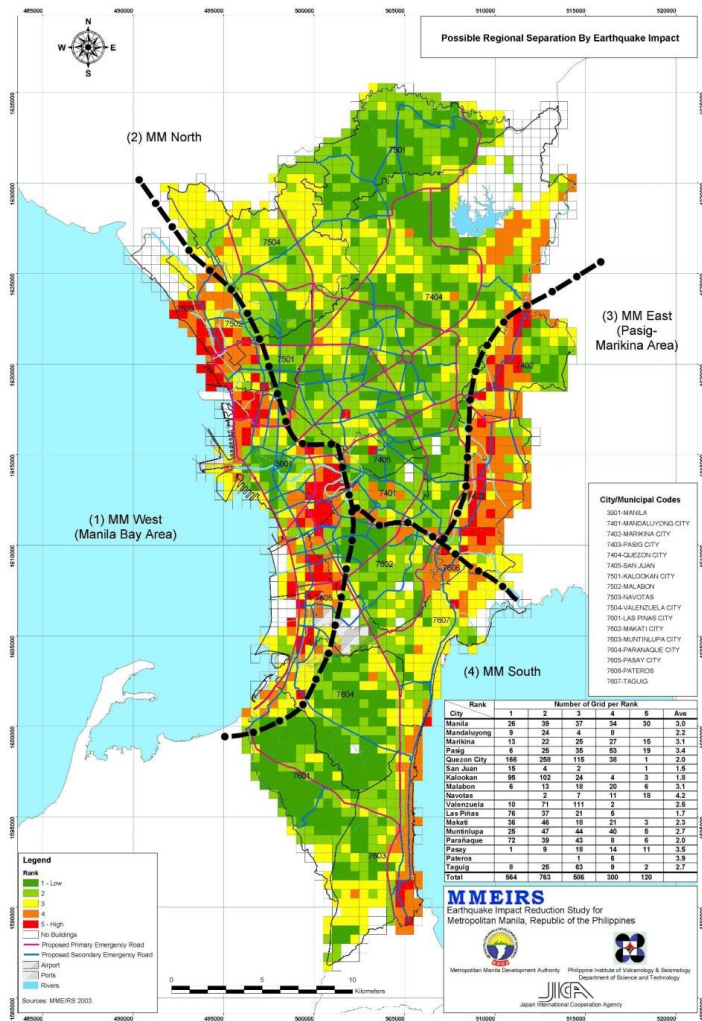
- Fire outbreak by electrical short circuit; toppling of lamps, candles
- Explosion of petroleum, gas tanks may cause spreading of fire

Maximum Burnt Number



(MMEIRS, 2004)





POSSIBLE ISOLATION DUE TO EARTHQUAKE IMPACTS (West Valley Fault Scenario)

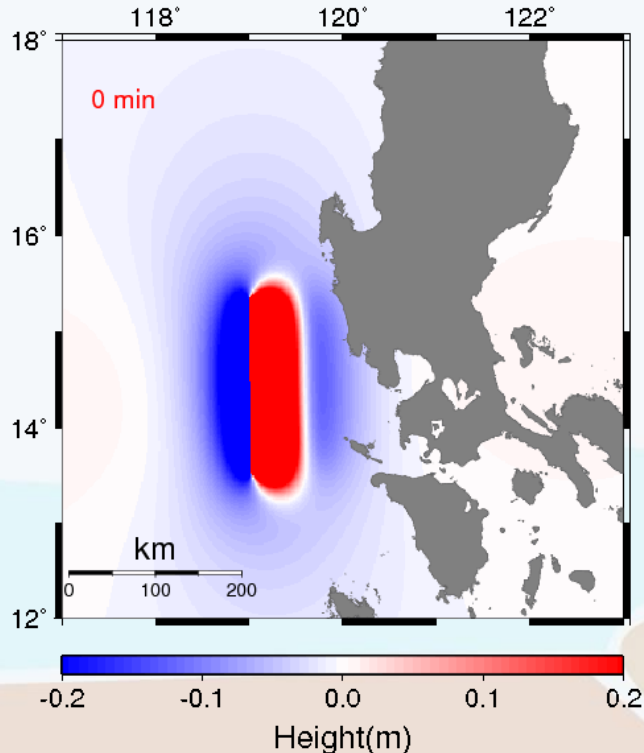
- *West*
 - Fire, Building Damage
- *North*
 - Bridge Damage
- *South*
 - Bridge Damage
- *East*
 - Building Damage, Bridge Damage

(MMEIRS, 2004)



TSUNAMI SCENARIO

M8.2 Earthquake from Manila Trench



Estimated Tsunami Height in Manila Bay:

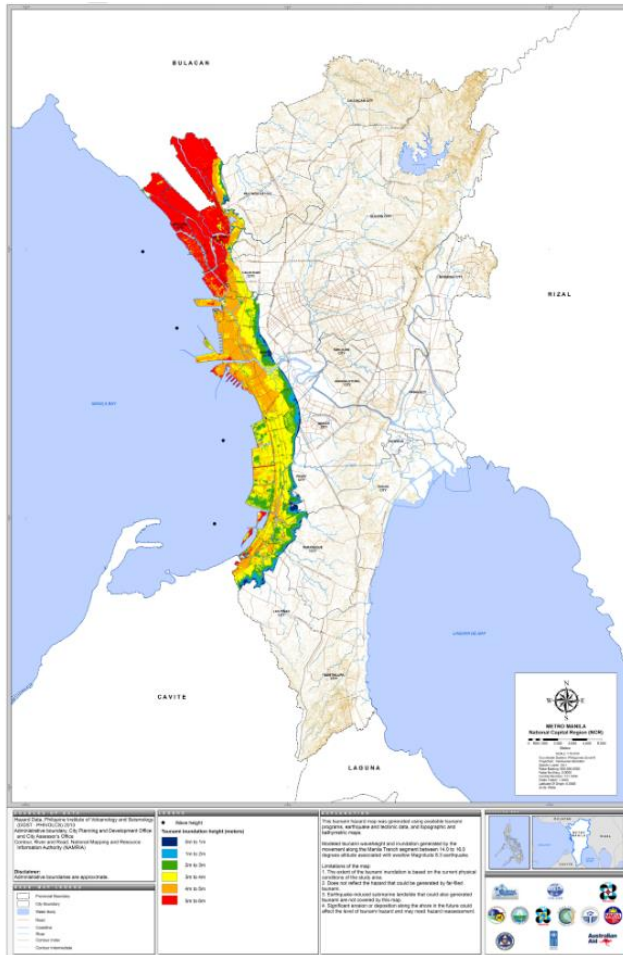
- 3.5 meters (mean sea level)
- 5.5 meters (+ 2m from tide)

Arrival Time:

- ≥ 1 hour



TSUNAMI HAZARD



STRATEGIES TOWARDS INTEGRATION OF STATISTICS & GEOSPATIAL INFORMATION

STRATEGIES

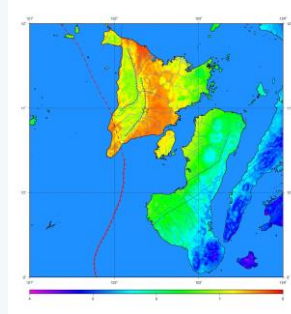


$$\text{RISK} = \frac{\text{Hazard} * \text{Exposure} * \text{Vulnerability}}{\text{Capacity}}$$

HAZARD AND IMPACT ASSESSMENT SOFTWARE (REDAS by DOST-PHIVOLCS)

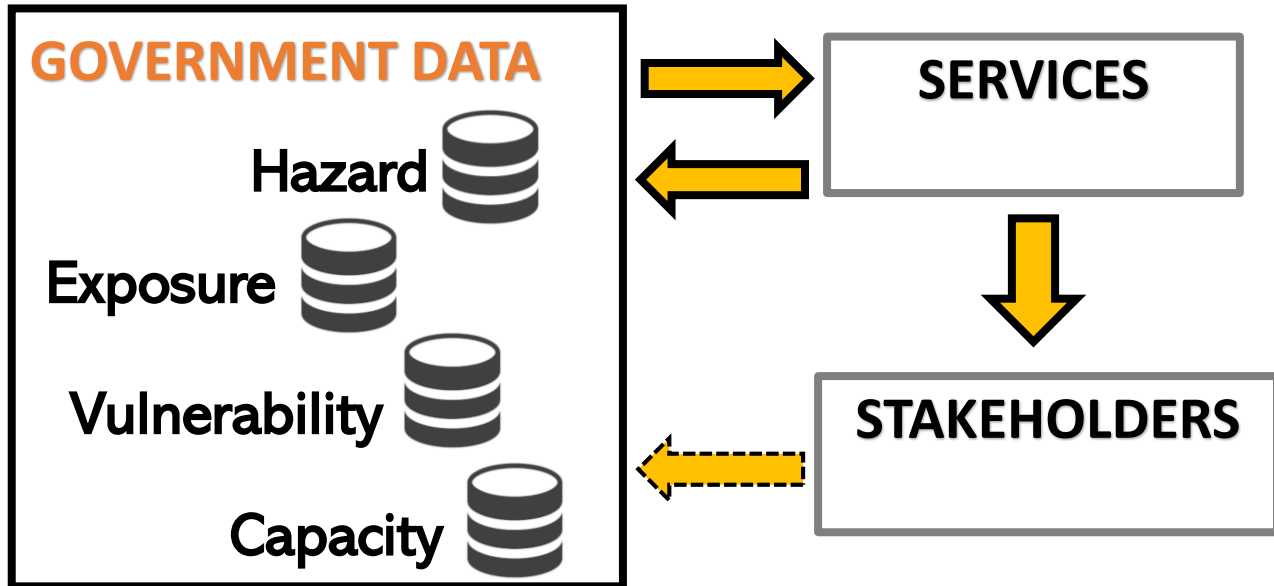
- **Hazard assessment module**
 - tools for assessing earthquake hazards; preparing scenarios
 - static maps of various hazards (geological, hydro-meteorological) can be integrated
- **Exposure database module**
 - contains database of elements at risk which can be updated by local government
- **Impact assessment module**
 - can estimate damage to buildings, casualty, economic loss

** being shared with local governments, national agencies, academic partners*



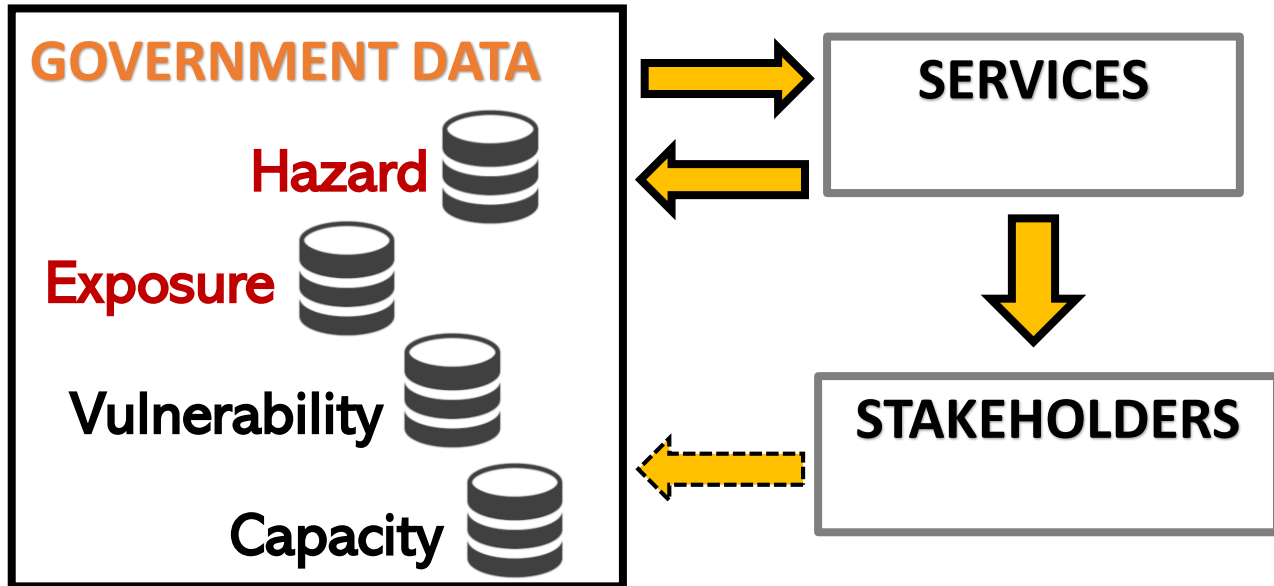
STRATEGIES

Geospatial Risk Information Management & Analysis Project for Hazards & Risk Assessment in the Philippines (GeoRiskPH)



STRATEGIES

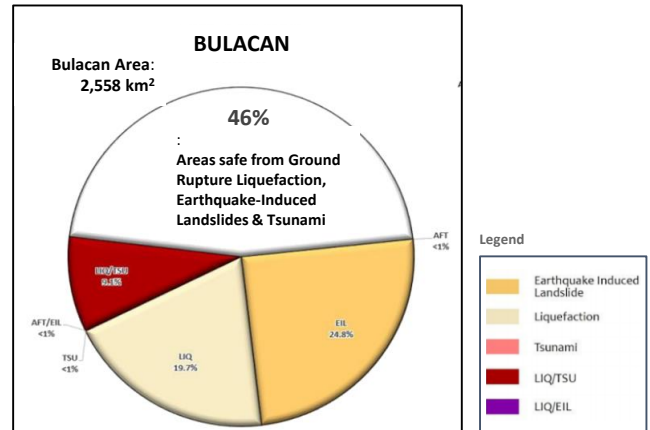
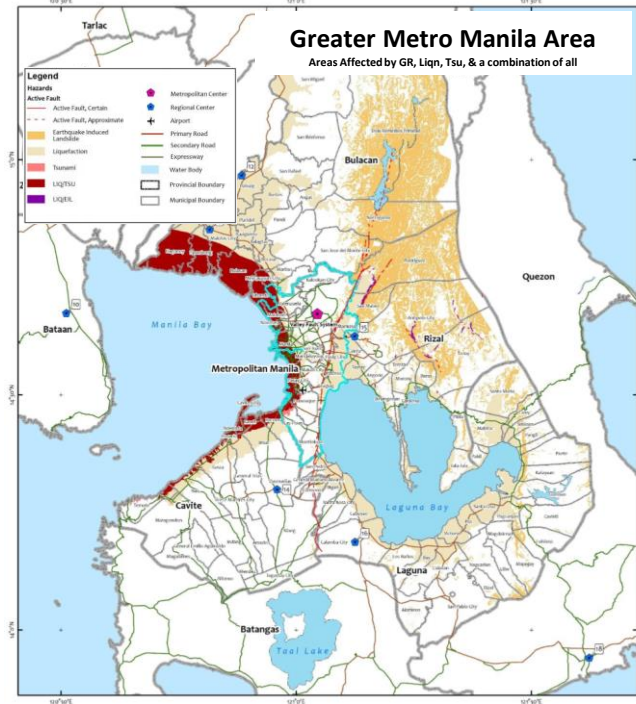
GeoRiskPH envisions to enable government & other stakeholders to make risk assessments effective & efficient



WAYS FORWARD

WAYS FORWARD

- Quick generation of hazards and risk information

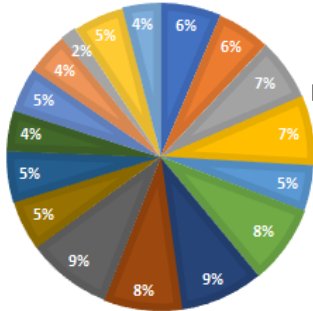


WAYS FORWARD

Analytics that may be
derived from GeoRiskPH
Database System

DISTRIBUTION OF PUBLIC SCHOOLS IN THE PHILIPPINES

■ Region 1 ■ Region 2 ■ Region 3 ■ Region 4A ■ Region 4B ■ Region 5
■ Region 6 ■ **Region 7** ■ Region 8 ■ Region 9 ■ Region 10 ■ Region 11
■ Region 12 ■ Region 13 ■ MM ■ ARMM ■ CAR

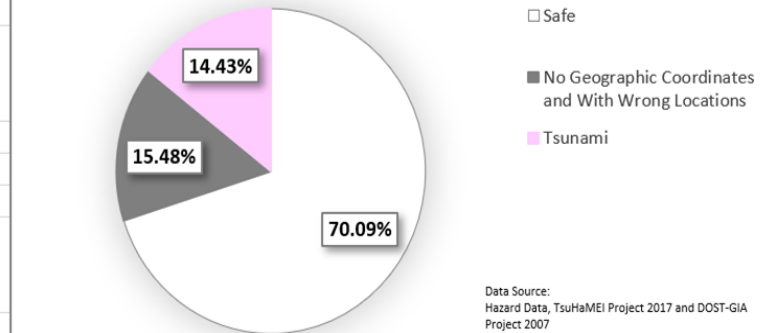


TOTAL NO.
OF
SCHOOLS
IN THE PHL:
~45,900

- Efficient conduct of **risk analysis** for generation of relevant & timely policies & development plans

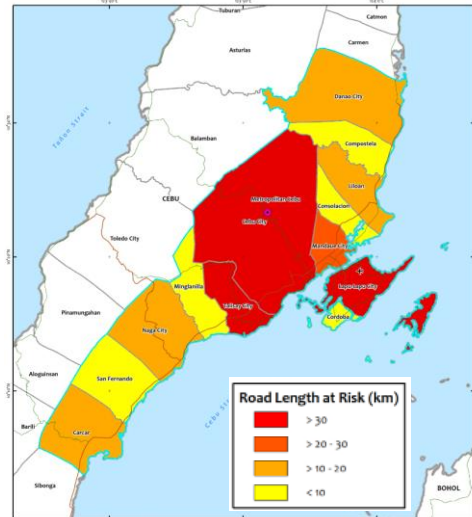
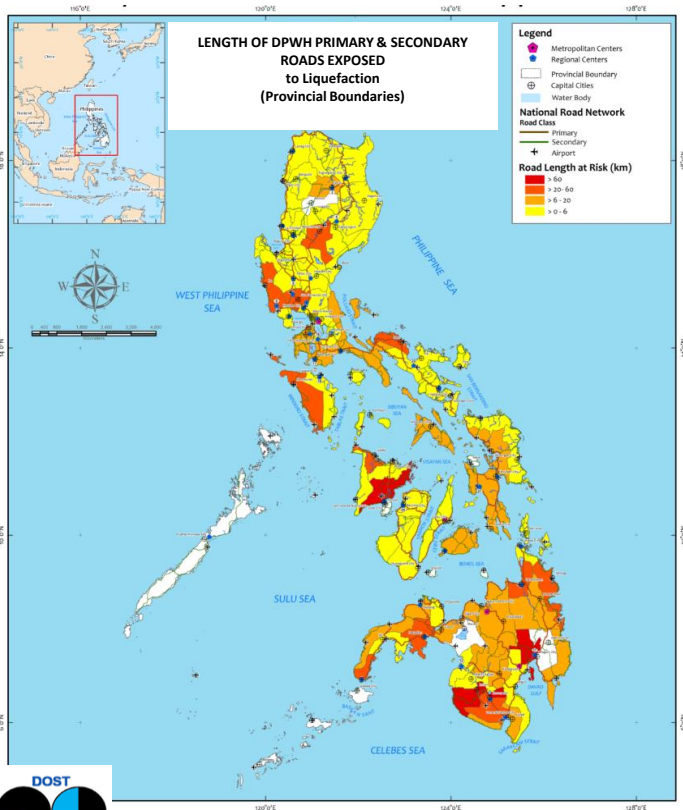
Public Schools Exposed to
Ground Rupture, Liquefaction, Tsunami and Earthquake-
Induced Landslides in **Region VII (3,741 schools)**

Percentage of Public Elementary and Highschool exposed to Tsunami Hazard in Region VII



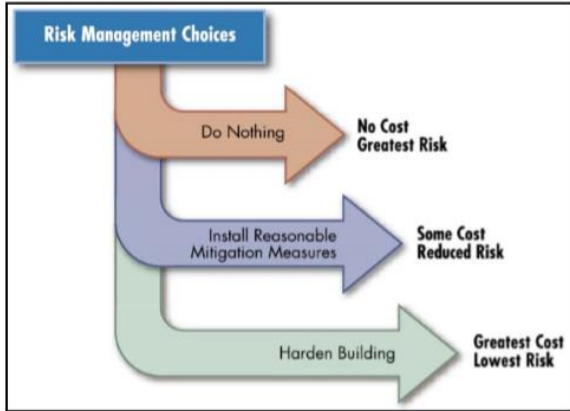
WAYS FORWARD

Efficient prioritization for
**allocation of funds and
efforts** for government
projects



**LENGTH OF DPWH ROADS EXPOSED to Ground
Rupture, Tsunami, Liquefaction, Earthquake-
Induced Landslides in Metro Cebu**

WAYS FORWARD



RISK TRANSFER (INSURANCE)

Example: School design and renovation project, three choices of how to address the risk (after FEMA, 2010).

Risk Acceptance: an informed decision to accept the possible consequences and likelihood of a particular risk;

Risk Avoidance: an informed decision to avoid involvement in activities leading to risk realization;

Risk Reduction refers to the application of appropriate techniques to reduce the likelihood of risk occurrence and its consequences;

Risk Transfer involves shifting of the burden of risk to another party. One of the most common forms of risk transfer is insurance.

WAYS FORWARD



*CREATION OF TOOLS,
SYSTEMS &
DEVELOPMENT OF
METHODS TO
MAKE INPUT &
ACCESS OF DATA INTO
DATABASES EFFICIENT*

WAYS FORWARD



*COLLABORATION
AMONG
GOVERNMENT
AGENCIES TO
STANDARDIZE
INPUT AND ACCESS
OF DATA*

WAYS FORWARD

CURRENT PARTNERS



*MORE AGENCIES
MAY BE ABLE TO
EFFECTIVELY
INTEGRATE
STATISTICS &
GEOSPATIAL
INFORMATION
FOR HAZARD &
RISK ASSESSMENT*

WAYS FORWARD



*EFFECTIVE AND
EFFICIENT
DISASTER RISK-
RELATED
PRODUCTS &
SERVICES THAT
WOULD BENEFIT
THE PUBLIC*

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