

添付資料 3 会議発表資料

Joint Coordinating Meeting on JICA Study on Insurance Mechanism for Incentivizing Disaster Resilient Public Infrastructures in Metro Manila

1. Background

GSIS's property insurance for public assets on natural disasters constitutes to be an important part of the Philippine Government's disaster risk finance strategy. Insuring public facilities is defined by relevant laws; however, some of the public facilities are uninsured and others are substantially underinsured where the insurance value falls below the replacement value. Such circumstances may lead to inappropriate risk transfer and undermine disaster risk finance strategy, thus GSIS desires to address these issues for possible improvement.

In addition to workable risk transfer measures, investment for disaster risk reduction, as well as efficient scheme to finance DRR investment, is regarded as indispensable part of disaster risk finance strategy to improve resiliency against natural disasters as stated in Third UN World Conference on Disaster Risk Reduction held in Sendai in 2015.

In line with this, JICA Study Team, in close collaboration with GSIS, is exploring ways to create a risk based insurance premium scheme on the public assets insurance program which may incentivize investment on disaster risk reduction, and thereby improve resiliency of the public facilities.

2. 1st JCM on November 16, 2016

The 1st Joint Coordinating Meeting (JCM) was held on November 16 1) to share challenges found in the course of the study with relevant agencies for their better understanding on current situation, 2) to discuss possible solutions to address and rectify underinsurance and no-coverage issues, 3) to discuss possible mechanism for incentivizing disaster resilient public infrastructure.

3. 2nd JCM on March 15, 2017

Based on the discussion in the 1st JCM and following separate meetings with relevant agencies, JICA study team compiled the draft final report of the study. JICA study team presents its final study results in the 2nd JCM. The objectives of the meeting are as follows.

- Discuss feasibility of the program for incentivizing disaster resilient public infrastructure through insurance scheme based on JICA study team's proposal
- Discuss next steps to be taken to realize safe and resilient society.

Meeting Agenda

Topic	Presenter	Time
1. Greetings		
Opening address by GSIS	Atty. Maria Obdulia Vitug-Palanca, Senior Vice President, GSIS	9:00 - 9:05
Opening address by JICA	Ms. Ayumu Ohshima, Senior Representative, JICA	9:05 - 9:10
2. Outcome of the JICA study		
Session 1: Resolve uninsured - underinsurance issues	Mr. Takeshi Kuwabara, Leader of JICA Study Team	9:10 - 9:40
Session 2: Risk-based insurance premium pricing	Mr. Takeshi Kuwabara, Leader of JICA Study Team	9:40 - 10:00
Break		10:00 - 10:10
Session 3: Program to enhance DRR investment	Mr. Takeshi Kuwabara, Leader of JICA Study Team	10:10 - 10:40
Wind and flood risk reduction: Damages, countermeasures and efficiency	Dr. Kazuyoshi Nishijima, JICA Study Team, Disaster Prevention Research Institute, Kyoto University	10:40 - 11:00
Break		11:00 - 11:10
3. Recommendations and discussion for next steps		
Session 4: Recommendations	Mr. Takeshi Kuwabara, Leader of JICA Study Team	11:10 - 11:25
Discussion		11:25 - 11:55
4. Closing		
Closing address by GSIS	Atty. Maria Obdulia Vitug-Palanca	11:55 - 12:00

SENDAI Framework for Disaster Risk Reduction – Priority Action

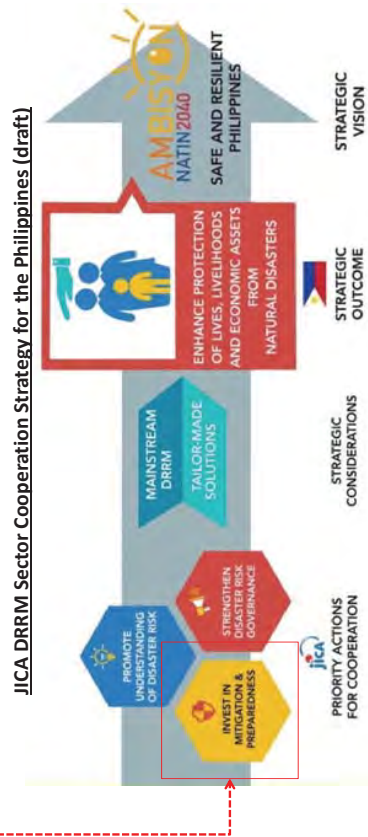
- Priority 1: Understanding disaster risk
- Priority 2: Strengthening disaster risk governance to manage disaster risk.
- Priority 3: Investing in disaster risk reduction for resilience (Risk transfer (30b) and Risk control mechanisms (30c))**
- Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.

Priority Action – Priority 3

National and local levels
30. To achieve this, it is important:
(b) To promote mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas;
(c) To strengthen, as appropriate, disaster-resilient public and private investments, particularly through structural, non-structural and functional disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and physical infrastructures; building better from the start to withstand hazards through proper design and construction, including the use of the principles of universal design and the standardization of building materials; retrofitting and rebuilding; nurturing a culture of maintenance; and taking into account economic, social, structural, technological and environmental impact assessments;

SENDAI Framework for Disaster Risk Reduction – Priority Action

- Priority 1: Understanding disaster risk
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- Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.



Source: JICA - DATA COLLECTION SURVEY FOR STRATEGY DEVELOPMENT OF DISASTER RISK REDUCTION AND MANAGEMENT SECTOR IN THE REPUBLIC OF THE PHILIPPINES, 2017

Disaster Risk Financing and Insurance strategy of the Philippines

Disaster risk financing strategy of the Philippines Source: DOF/ ASEAN DRFI Forum 2/2/2017

Development objectives	National Level	Local Level	Individual Level
<ul style="list-style-type: none"> ○ Maintain sound fiscal health ○ Develop sustainable financing mechanisms ○ Reduce the impact on the poorest and most vulnerable; shield the near-poor 			
Strategic priorities			
1 Key step	Improve the financing of post-disaster emergency response, recovery, and reconstruction needs	Secure funds for post-disaster recovery needs	Empower poor and vulnerable households and owners of small and medium-sized enterprises
Initiative	Quantifying and clarifying the contingent liabilities faced by the National	Develop a catastrophe risk insurance facility for local governments	Broadening private property catastrophe risk insurance and micro-insurance coverage
Key step	● Philippines CAT Risk model 2014 ● Risk analysis	● Local disaster resilience insurance fund	● Potential residential insurance pool
2 Key step	Contingent credit lines to protect against moderate disasters	Pooling local governments' calamity funds	Linking disaster risk financing and social protection
Initiative	● CAT-DDO (World Bank) ● SECURE (IICA)		
3 Key step	Using risk transfer to access international private reinsurance and capital markets	Improving insurance of public assets	Issues to be resolved
Initiative			

- Risk transfer mechanism to access an insurance and capital market for financial protection
- Provides insured with fund for post-disaster restoration of the government assets

Resolve the issues in risk transfer and promote Disaster Risk Reduction (DRR)

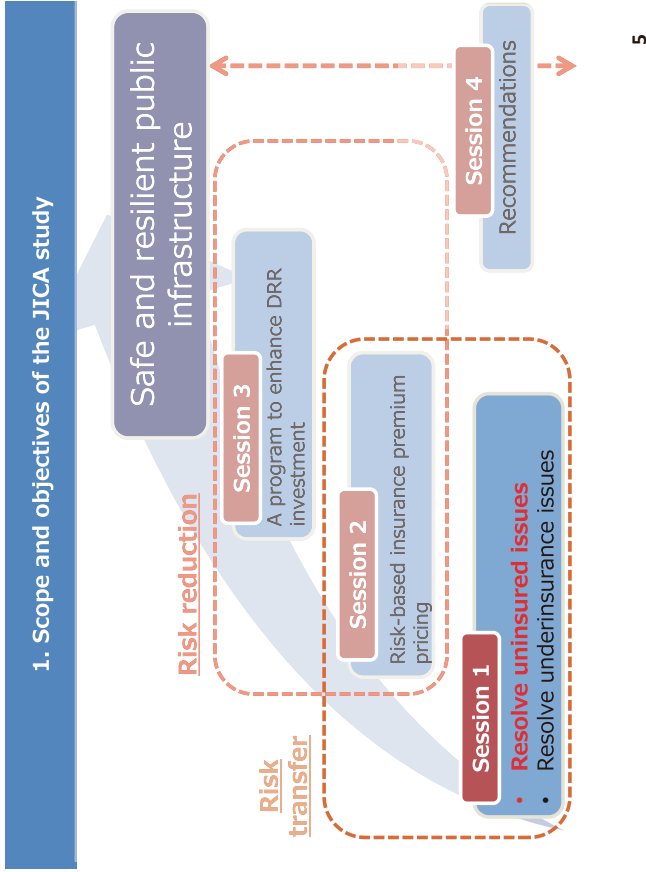
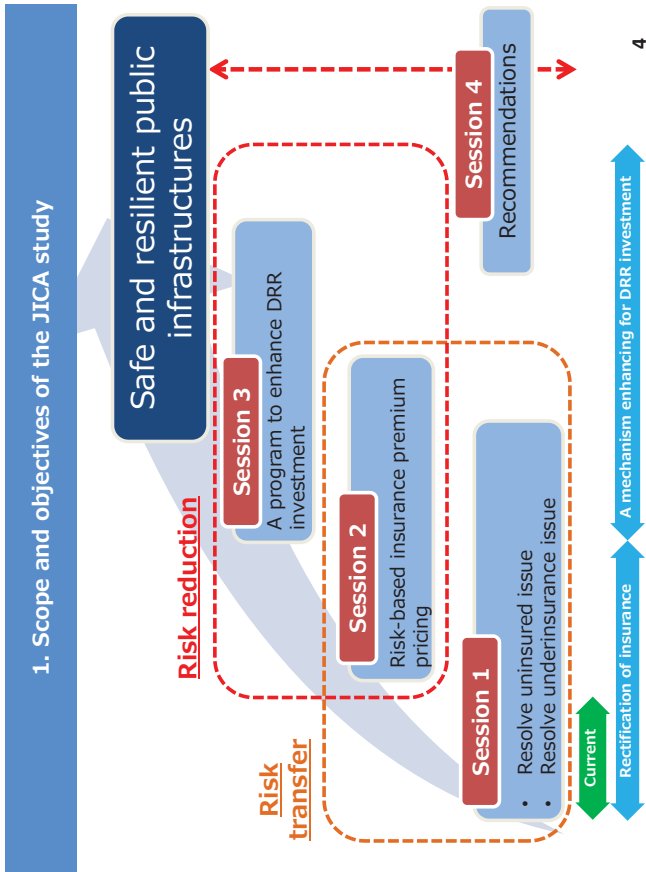
The 2nd JCM

Outcome of the JICA Study

Insurance mechanism for incentivizing disaster resilient public infrastructures in Metro Manila

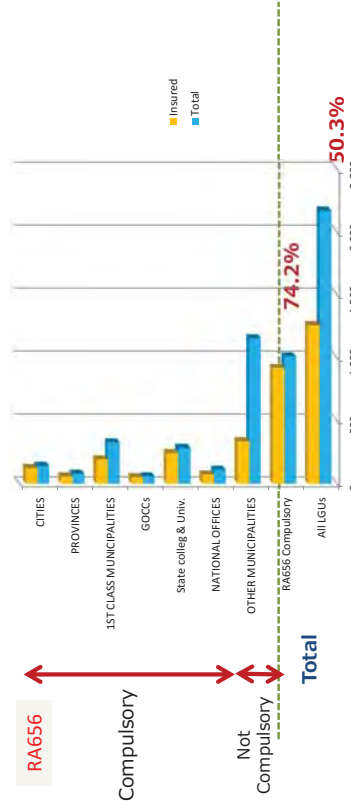
Session 1: Resolve uninsured - underinsurance issues

March 15, 2017



2. Uninsured – current situation over the Philippines

- RA656 (Property Insurance Law)
- Government and agencies with compulsory requirement: Enrollment rate for Fire coverage **74.2%**
- Include LGUs excluded from compulsory requirement: Enrollment rate for Fire coverage **50.3%**



Substantial gap exists to fully protect the government assets against damage from natural disasters

2. Uninsured – Metro Manila public schools

Public schools in Metro Manila: **Fire policy 52.3%** with **natural disaster policy 27.9%**

Location	# of school		Policy coverage for natural hazard			
	Total	Insured	Fires Lighting	Earth-quake	Typhoon	Flood
1. Manila	106	85				
2. Quezon	142	140				
3. Pasay	32	28				
4. Caloocan	88	11				
5. Mandaluyong	29	5				
6. Marikina	31	0				
7. Makati	37	35				
8. Pasig	40	39				
9. San Juan	9	8				
10. Parañaque	32	4				
11. Las Pinas City	32	0				
12. Valenzuela City	58	18				
13. Malabon	40	0				
14. Navotas	21	0				
15. Taguig	44	10				
16. Muntinlupa	26	18				
Total	767	401				

Public schools in Metro Manila – Insurance enrollment for 767 schools	
Insured	401 (52.3%)
- Fire policy only	187 (24.4%)
- With natural disaster policy	214 (27.9%)

Need to increase enrollment rate for natural disaster policy

2. Uninsured – Current situation, problems and causes

Situation

- Enrollment rate for all national government agencies and LGUs (NGAL)
 - Number of all NGALS 2,173
 - Number of insured 1,092 (50.3%) only
- Enrollment rate for compulsory requirement per RA656
 - Number of all NGALS: 1,014
 - Number of insured: 752 (74.2%) only
- Public schools in Metro Manila
 - Insured with natural disaster policy 214 schools (27.9%) only

Issues

Insurance, a risk transfer mechanism, may not work as intended

- Restoration cost of damaged assets must be paid by the property owner
- Funding to support restoration will be fiscal burden to the national government

Causes

- Lack of mechanism to enforce compliance with RA656
- RA656 compulsory requirement does not apply to Municipalities below 1st grade.
- Inadequate awareness of natural disaster and expected damage
- Buying insurance is not a priority in DRRM

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2. Uninsured – Initiatives taken to date by relevant agencies

Causes

- Lack of mechanism to enforce compliance with RA656
- RA656 compulsory requirement does not apply to Municipalities below 1st grade.
- Inadequate awareness of natural disaster and expected damage
- Buying insurance is not a priority in DRRM

Initiatives taken to date

- Compliance with RA656 will be examined by COA audits
- Revision of RA656 (property insurance law) and RA10121(NDRRM)
- GSIS Insurance caravan (NDRRM activities)
- 2017 National budget (NDRRMF): Php1B for insurance

Initiatives to promote insurance enrollment has been progressed by the relevant agencies

- GSIS should monitor outcome of legislative process and enrollment rate improvement

Recommendations

- Modification of deductible clause in the policy for natural disaster may make the property insurance more attractive

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2. Uninsured – Proposal of additional measures

Deductibles provision for damage caused by natural disaster

The current deductible provision requires the insured to retain loss for the small to medium damage by typhoons and flood.

(Typhoon)

It is understood and agreed that **the Insured shall bear the first 2% of the actual value of the affected item/s** under this endorsement on any one Typhoon occurrence the duration and extent of which shall be limited to 168 consecutive hours.

(Flood)

IT IS UNDERSTOOD AND AGREED, THAT the Insured shall bear the portion of the loss or damage caused by Flood to each affected item of insured property **equivalent to 2% of its actual cash value at the time of loss**, for each claim or series of claims arising out of any one Flood occurrence,

(EQ)

IT IS UNDERSTOOD AND AGREED, THAT the Insured shall bear that portion of the loss or damage caused by earthquake to each affected item of **insured property equivalent to 2% of its actual cash value at the time of loss**,

Change of deductible provisions to address the insured's needs may make the property insurance program attractive to the insured

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Session 1 – Eliminate underinsurance accounts

Safe and resilient public infrastructures

Risk reduction

Session 3
A program to enhance DRR investment

Risk transfer

Session 2
Risk-based insurance premium pricing

Session 1
Resolve uninsured issues
• **Resolve underinsurance issues**

Session 4
Recommendations

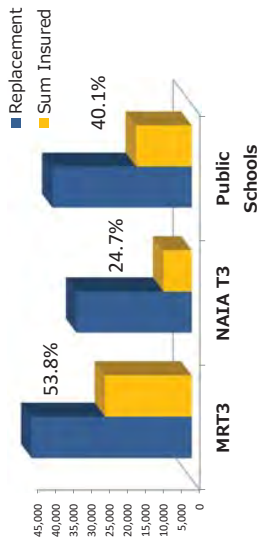
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3. Underinsurance – current status

- Insured value to Estimated Replacement Cost

MRT3 53.8%, NAIA T3 24.7%

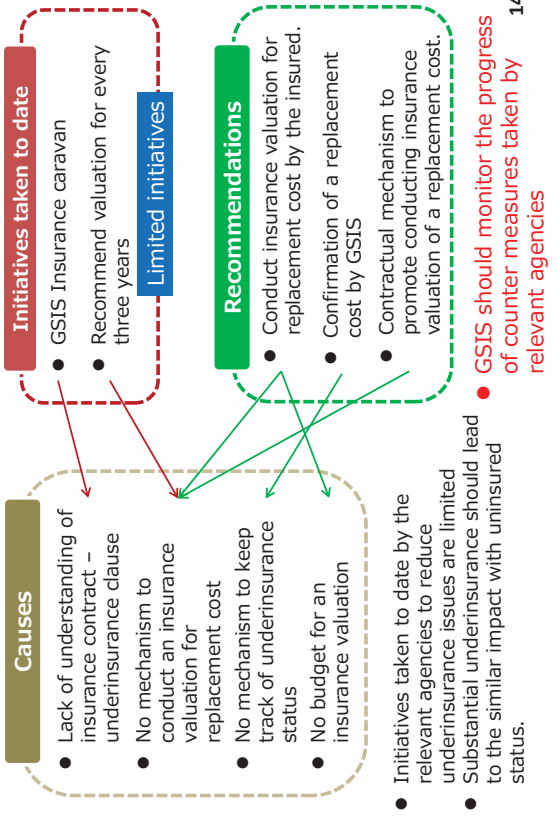
Public schools in Metro Manila: estimated at 40.1% in average (11.6%-80.1%)



Metro Manila public schools			Pip in thousand	
Insured	Replacement cost	Sum Insured	Underinsurance	Insurance to value
MRT3	44,510,826	23,958,144	53.8%	
NAIA T3	31,958,371	7,880,530	24.7%	
Public schools	38,700,000	15,500,000	40.1%	

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3. Underinsurance – Initiatives take to date and further measures



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3. Underinsurance – Current status, Problems and causes

Current status

- Substantially underinsured
 - MRT3 53.8%
 - NAIA T3 24.7%
 - Average at public schools 40.1%

Problems

Insurance, a risk transfer mechanism, may not work as intended

- Restoration cost of damaged assets must be partially paid by the property owner.
- Funding to support restoration will be fiscal burden to National Government

Causes

- Lack of understanding of insurance contract – Underinsurance clause
- No mechanism to conduct an insurance valuation for replacement costs
- No mechanism to keep track of underinsurance status
- No budget is allocated to conduct an insurance valuation

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3. Underinsurance – Additional measures

- Conduct insurance valuation for replacement cost by the insured – large public infrastructures
- Conduct insurance valuation for replacement cost by the insured – Public schools
- Conduct insurance valuation for replacement cost by the insured – General public buildings
- Confirmation of a replacement cost by GSIS
- Insurance contractual mechanism to promote conducting evaluation of a replacement cost

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3. Underinsurance – Additional measures

e) Insurance contractual mechanism to promote conducting evaluation of a replacement cost

Analysis

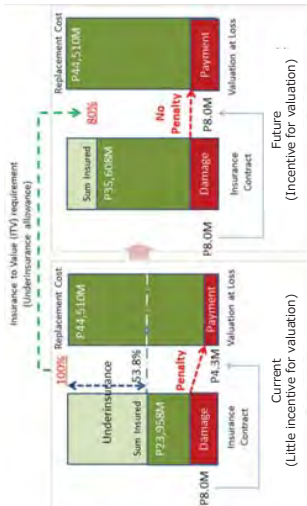
- Current policy clause require 100% “insurance to value”, in reality, while it is difficult to fully comply.

Challenges

- Underinsurance issues only reveals when the damage is occurred.
- No awareness of underinsurance penalty.
- No incentives to rectify the underinsurance.
- When premium rate is same, insurance premium will be increased.

Action (GSIS)

- Relax current underinsurance requirement from 100%. (e.g. 100% to 80%/90%)
- Instead, the insured is responsible to conduct an insurance valuation
- Consider premium discount as well



Case study for MRT 3 : Mechanism and impact of underinsurance, and recommendation 20

4. Summary

1. Property insurance system for Government assets is an effective insurance mechanism.
2. While insurance payments should be adequate to promote “Build Back Better concept”, uninsured and underinsurance are issues to be solved.
3. While countermeasure and initiatives by relevant agencies to increase the national government agencies and LGUs protected by the insurance have been in place and continue, increase of natural disaster coverage should also be focused.
4. Uninsured and underinsurance bring same results that will require additional cash to cover the cost of restoration of damaged facilities.
5. Implementation and monitoring of countermeasures for improvement

Countermeasures	
Uninsured issues	Underinsurance issues
(COA) Focusing compliance at COA audits	(Infrastructure) Insurance valuation by third party
RA656/RA10121 Proposal to increase compulsory	(Public schools) Construction unit price by DepEd/DPWH
2017 National government allotment – NDRRMF - Php 1B for insurance premium	(Office building) Construction unit price by DPWH
GSIS Insurance promotion caravan	(GSIS) Ability to verify underinsurance
(GSIS) Customized insurance contract – lower deductible and limit of liability	(GSIS) Rules for insurance valuation and relax of underinsurance penalty
Additional measures	

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The 2nd JCM

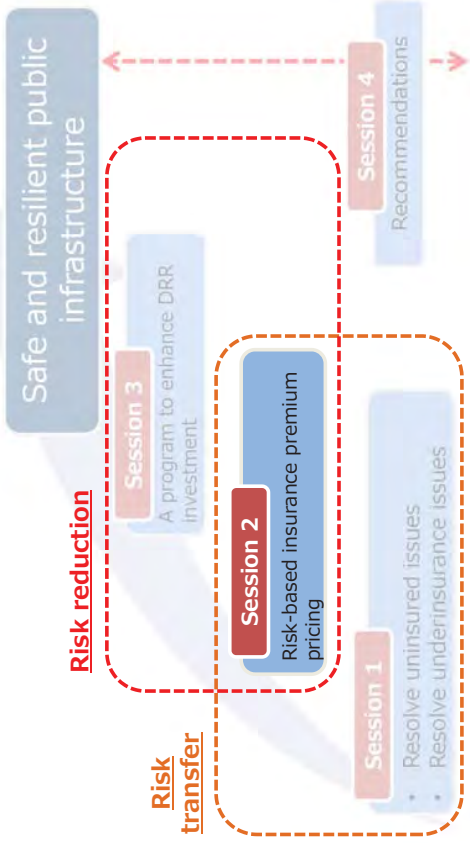
Outcome of the JICA Study

Insurance mechanism for incentivizing disaster resilient public infrastructures in Metro Manila

Session 2: Risk-based insurance premium pricing

March 15, 2017

1. Scope and objectives of the JICA study



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2. Insurance premium pricing

EQ Premium rate

- Insurance premium follows to Tariff rate approved by IC (Insurance Commission)

- Location class: Two zones per province
- Building class: Seven classes per building height

Earthquake Tariff	
Area 1	Area 2
0.140%	0.140%
0.170%	0.170%
0.240%	0.240%
0.300%	0.300%
0.380%	0.380%
0.470%	0.470%
0.600%	0.600%

Full Earthquake Rate

Structures of 1 and 2 stories in height

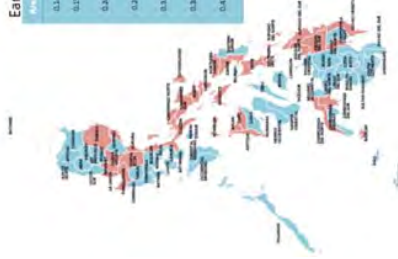
Structures of 3 and 4 stories in height or the equivalent thereof

Structures of 5, 6 and 8 stories in height or the equivalent thereof

Structures of 9, 10, 12 and 13 stories in height or the equivalent thereof

Structures of 14, 16, 18 and 20 stories in height or the equivalent thereof

Structures of 21 or more in height or the equivalent thereof



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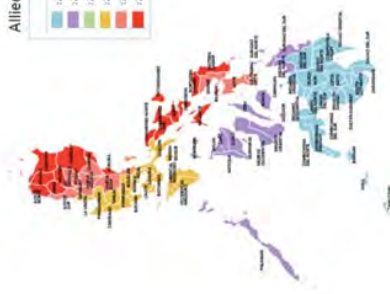
2. Insurance premium pricing

Typhoon, Flood

- Insurance premium follows to Tariff rate approved by IC (Insurance Commission)

- Location risk: 6 distinct zones per province

Allied Perils Tariff	
Typhoon	Flood
.720% I	0.020%
.720% II	0.020%
.720% III	0.040%
.720% IV	0.020%
.720% V	0.040%
.720% VI	0.020%
.720% VII	0.060%



Flat rate pricing

- Flat rate within a province
- Same rate regardless of age of the buildings, roof type, flood protection

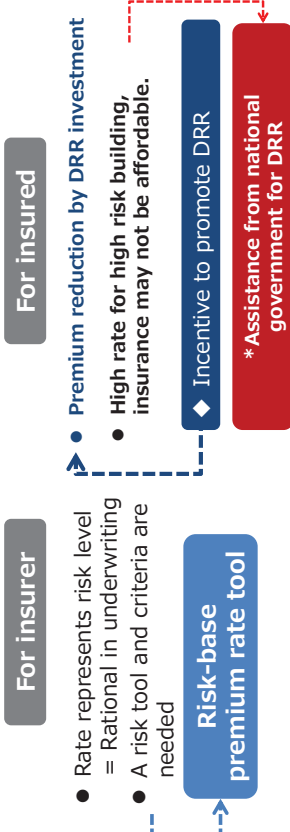
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3. Insurance premium rate pricing comparison (current practice vs risk base pricing)

Current Flat rate pricing



Risk base premium rate



*Assistance from national government should not disrupt incentive to promote DRR

4. Risk base insurance premium rate tool - objectives

Objectives of development

- Target: Earthquake, Typhoon, Flood, Storm surge, Tsunami in Metro Manila
- Insurance premium calculation tool based on **Natural Hazard and Vulnerability of the facility.**
- Increased strength of the facility against natural disaster is reflected into premium rate.

Other features

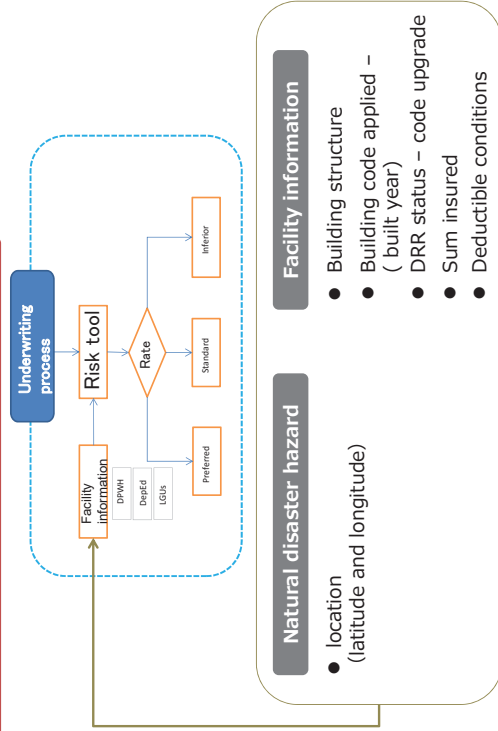
- Evaluate probable damage per frequency for single or group buildings. e.g. Information to determine limit of liability
- GIS-base platform – QGIS enable to insurer to underwrite the risk visually displayed hazard information
- Open plat form for future expansion



- The tool is developed based on hazard and vulnerability information provided by the Philippines technical institutions. (PHIVOLCS, PAGASA, NAMRIA, UP) 5

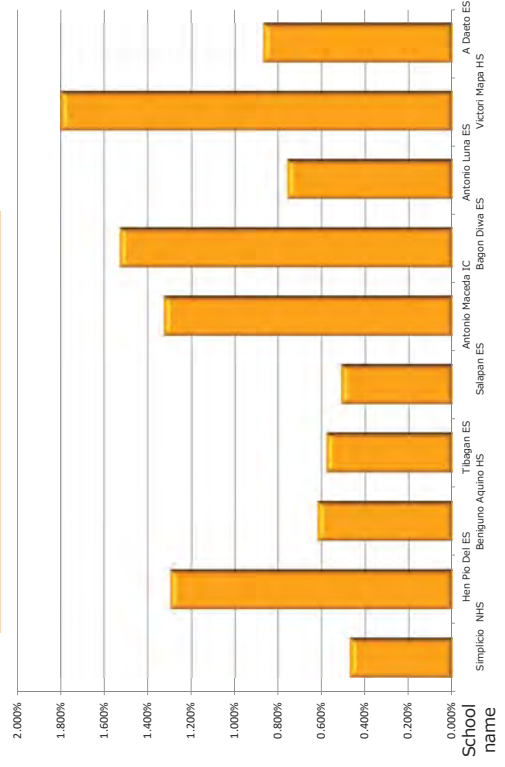
5. Risk base insurance premium – calculation flow

Risk base premium calculation flow



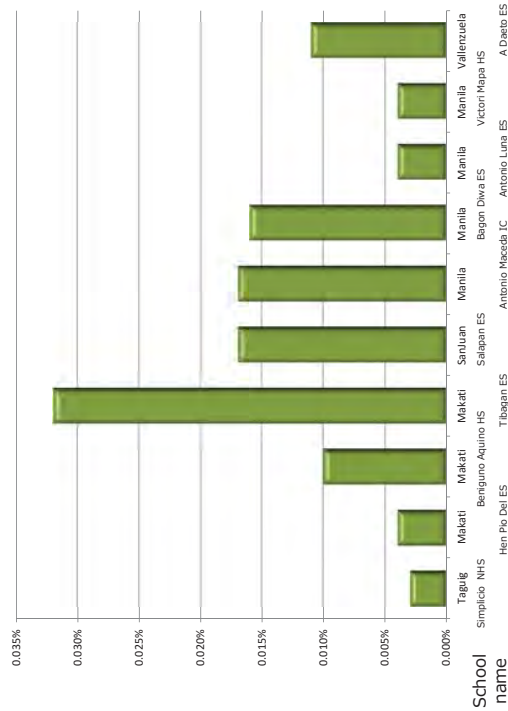
6. Risk base insurance premium rate for public schools

Rate -EQ : 0.470% ~ 1.800%



6. Risk base insurance premium rate for public schools

Rate - Typhoon: 0.003% ~ 0.0320%



8. Estimated loss for all public schools in Metro Manila – replacement cost base

Estimated loss for all public schools in Metro Manila – replacement cost base

Return period	EQ	Typhoon	Flood
Year	Loss amount (Php)	Loss amount (Php)	Loss amount (Php)
500	15,085,338,521	209,030,404	450,859,272
200	8,710,858,880	144,829,803	397,617,514
100	5,803,365,681	97,879,020	353,288,145
50	2,644,257,401	60,787,880	307,844,299
25			265,735,299
10			224,598,805
5			69,916,486
2			36,785,725

Very extensive damage
Estimated loss for West Valley scenario
Php 12.7508 (345 year - Return period)

Social impact
Many of schools suffer from flood damage

7. Risk base insurance premium and loss estimate – MRT3 and NAIAT3

Public infrastructure – MRT3 and NAIAT T3
Insurance premium rate and estimated maximum loss for Earthquakes

Risk base rate - result

Premium Rate	MRT3	NAIAT T3
EQ	0.17%	0.27%

Rational insurance premium

Verify estimated maximum loss per return period

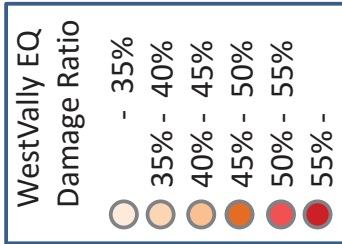
Facility	Current policy		Risk Tool		Php in thousand	
	Sum Insured (Note 1)	Limit of liability Amount	Return period (year)	Replacement cost	Estimated loss Amount	%
MRT3	23,958,144	5,500,000	23.0%	44,510,825	8,563,183	19.2%
			200		3,337,689	7.5%
NAIAT T3	7,880,530	1,500,000	19.0%	31,958,371	4,236,073	13.3%
			200		2,602,315	8.1%

Note 1): Reinsurance bid information for 2016 renewal

9. Estimated damage ration caused by West Valley scenario

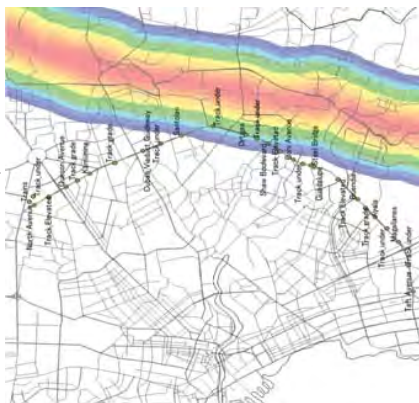
- Extensive damage along the WV fault
- Vulnerable schools are identified

Setting priority for Retrofit and relocation

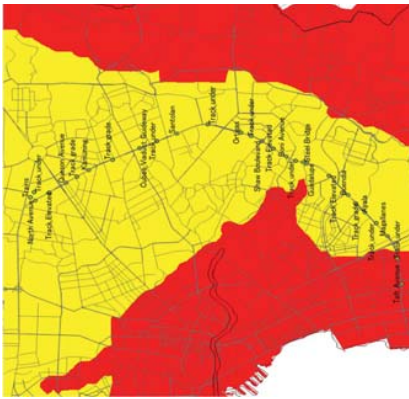


10. Seismic image along the West Valley and soil conditions

West Valley fault and MRT 3 Track layout



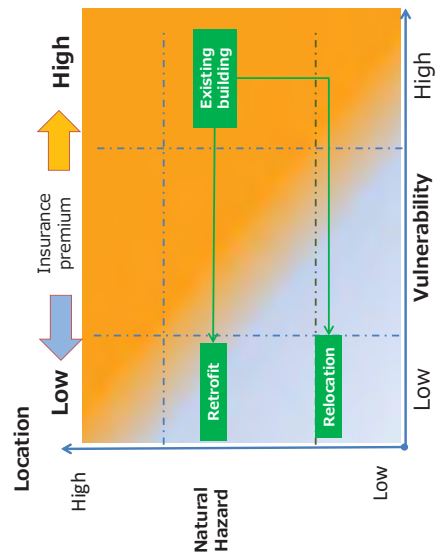
Soil conditions and MRT3 Track layout



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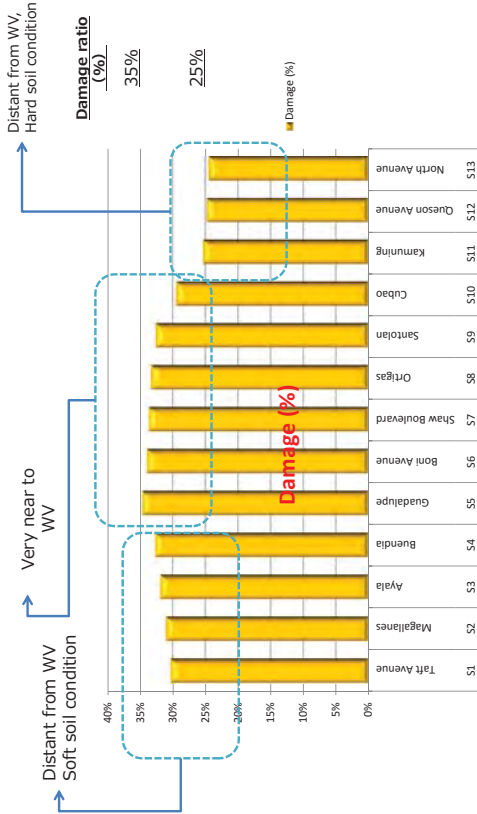
12. Risk base premium rate and DRR investment

$$\text{Natural disaster risk} = \text{location} \times \text{vulnerability of building} = \text{Risk base rate}$$



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11. Estimated loss by station for West Valley EQ scenario



Damage ratio per station

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13. Risk base premium rate and DRR investment

Premium rate reduction by DRR

Premium			EQ Rate			Wind Rate			
School ID	Name	City	Existing (A)	Retrofit (B)	Premium reduction (A-B)/A	Cost / premium discount Year	Existing (A)	Retrofit (B)	Premium reduction (A-B)/A
320807	Simplicio NHS	Taguig	0.470%	0.470%	0%	-	0.003%	0.003%	0%
138704	Hen Pio Del Pilar ES	Makati	1.300%	0.480%	62%	31	0.004%	0.001%	75%
305412	Benigno Aquino HS	Makati	0.620%	0.480%	21%	182	0.010%	0.003%	70%
138697	Thagan ES	Makati	0.580%	0.360%	38%	114	0.032%	0.001%	97%
138745	Salapan ES	SanJuan	0.510%	0.310%	39%	125	0.017%	0.001%	94%
138469	Antonio Maceda IC	Manila	1.330%	0.510%	62%	30	0.017%	0.001%	94%
138482	Bagon Diva ES	Manila	1.530%	0.580%	62%	26	0.018%	0.001%	94%
138422	Antonio Luna ES	Manila	0.780%	0.460%	39%	83	0.004%	0.000%	100%
305315	Victoriano Mapa HS	Manila	1.800%	0.660%	63%	22	0.004%	0.001%	75%
138800	A. Diestro ES	Vallenzuela	0.870%	0.670%	23%	125	0.011%	0.003%	73%

DRR – Retrofit reduce premium rate substantially

Very long period to recover retrofit work cost from insurance premium saving alone
Consider assistance from national governments for DRR investment on vulnerable buildings

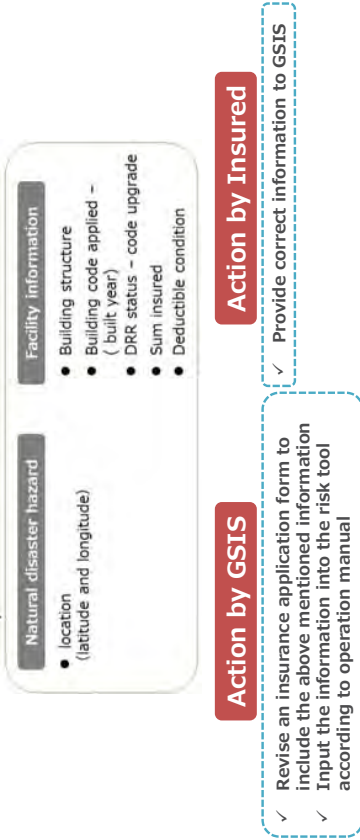
Additional incentive mechanisms → Session 3

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14. Recommendations

Introduction of Risk base premium pricing

1. The developed risk tool can provide risk-base premium for all public schools in Metro Manila against natural disasters.
2. The information needed to operate the tool is mostly available at DepEd school inventory data base.

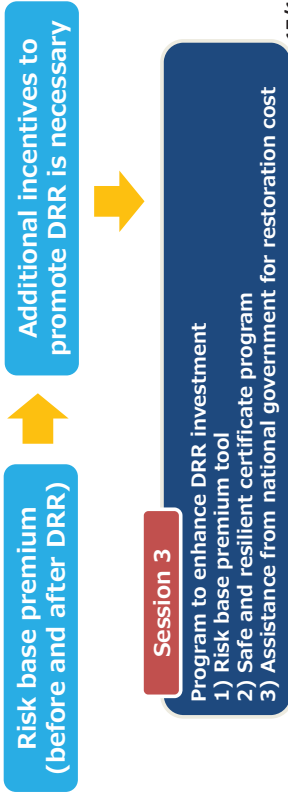


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15. Recommendations

Promoting DRR investment through Risk base insurance premium

- 1) Difference in premium before and after DRR investment is not substantial in comparison with building cost or restoration cost.
- 2) In order to enhance DRR investment, it is suggested to have additional incentive to promote DRR investment into the property insurance program.
- 3) Higher premium rate for high risk building. Insurance may not be affordable for high risk properties.



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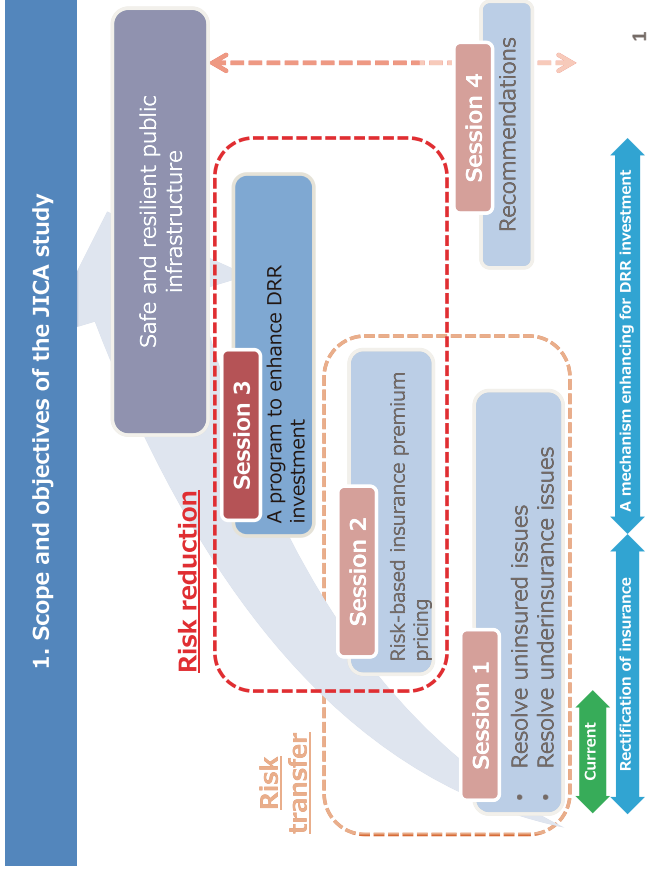
The 2nd JCM

Outcome of the JICA Study

Insurance mechanism for incentivizing disaster resilient public infrastructures in Metro Manila

Session 3: Program to enhance DRR investment

March 15 2017



2. Damage Estimation of Public Schools in Metro Manila (Loss of human lives)

West Valley M7.2 Earthquake Scenario

Potential Damage studied by JICA/MMDA/PHIVOLCS MMEIRS in 2004

- West Valley M7.2 Earthquake Scenario
- Number of collapsed buildings in MM: **168,300** (12.7%)
- Number of Deaths: **33,500** (0.3%)
- Time of occurrence : Early evening
- Collapsed public buildings : 8-10%
- Many schools and hospitals build with RC Frames → **High death rate when collapsed**

Damage Estimated by World Bank in 2014

- In total **24,000 student could be killed** in all 3,821 buildings
- With seismic retrofit of 5% (186 buildings) of school buildings can reduce the number of death by 25%
- Retrofit of 40% (1,466 buildings) of school buildings can reduce the number of death by 80%

School buildings collapsed during class hours due to large earthquake may result in lost of many student's life

3. General Insurance and disaster prevention investment

Traditional Concept → Property Insurance = Risk Transfer

Sendai Framework

NDRRM

Risk Reduction

- Enough insurance cannot be provided without risk control because premium becomes too high to afford.
- Risk transfer itself will not reduce loss of human lives

Insurance = Risk transfer for reconstruction + **Damage reduction by DRR investment**

Apply to GSIS's insurance for property insurance

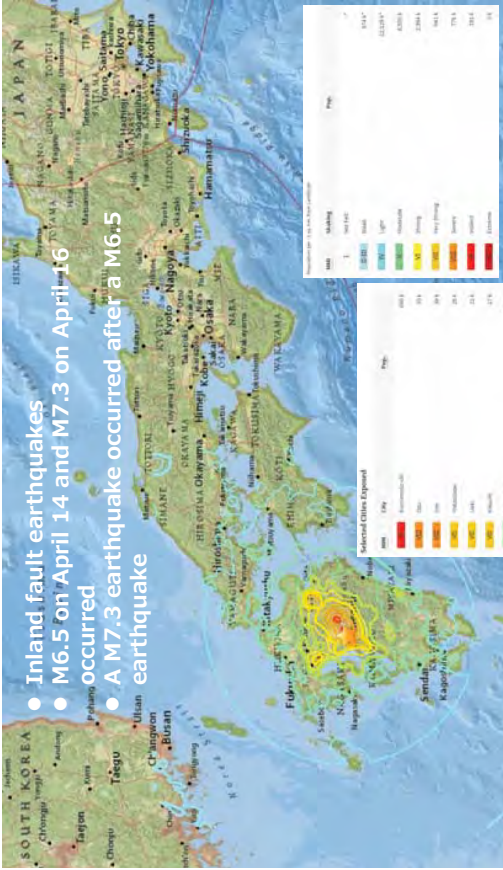
Kumamoto Earthquake in April 2016

No structural collapse for retrofit buildings
Seismic Retrofit contributed to damage mitigation

Case of Japan (Next Slide)

4. School damage caused by the Kumamoto earthquake

- Inland fault earthquakes
- M6.5 on April 14 and M7.3 on April 16 occurred
- A M7.3 earthquake occurred after a M6.5 earthquake



USGS: <https://earthquake.usgs.gov/earthquakes/eventpage/us2005is#map>

5. School damage caused by the Kumamoto earthquake

- Structural Damage without seismic retrofitting



- Non-structural Damage with seismic retrofitting



<最上階ホール天井の脱落>

<廊下天井等の破損>

6. School damage caused by the Kumamoto earthquake

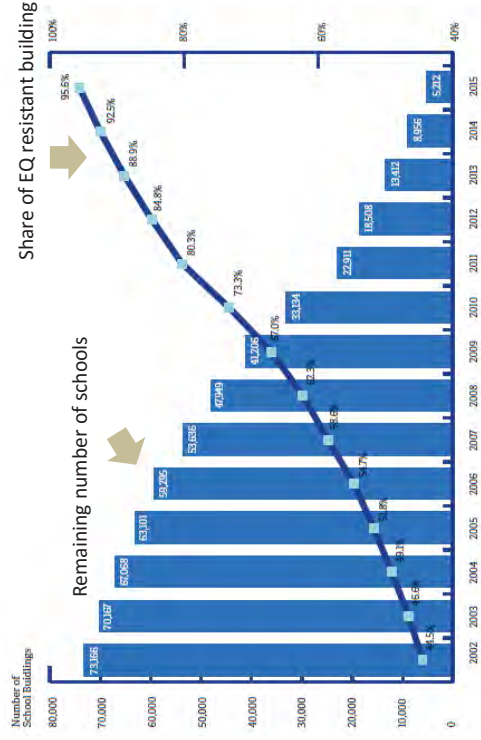
- Serious damage such as a building collapse did not occur at the buildings with seismic retrofit.
- Serious structural damage including destruction of pillars occurred at non seismically retrofit buildings

School Type	School Division	Number	Affected	Affected Rate	Retrfit work comelted
Public	Elementary School	364	222	61%	98.5%
	Junior High school	161	112	70%	
Private	Junior High school	9	9	100%	74.1%
	High school	21	20	95%	

Damage Type	Seismic Retrofitting	Damage Situation
Structural Member	Seismic Retrofitted/ New quake-resistance standards	No serious damages including building collapse
	Not Supported	Some buildings with serious structural damages including pillar shear-failure and axis collapse
Non-Structural Member	Seismic Retrofitted/ New quake-resistance standards	Damages to ceiling, glass window, pipe, brace and exterior wall
	Not Supported	Great number of damages to ceiling, light, glass window, external material, and equipment
Human Lives	Damage	Reason
Students	No	Both earthquakes occurred at night. First shock was at 09:26PM and main shock was at 01:25AM.

7. Seismic Retrofitting of Public schools in Japan

Share of public elementary and junior high schools whose main structures are earthquake-resistant



<http://pubdocs.worldbank.org/en/148921478057894071/110216-drrhubtkyo-Making-Schools-Resilient-at-Scale.pdf>

7. Seismic Retrofitting of Public schools in Japan



Figures-1(a) Seismic upgrading Methods

8

9. Incentivize Disaster prevention investment by Disaster Resilient Certification

Conditions for Disaster Resilient Certification

- Safety of users' human lives (School: Student, faculty and staff, Transportation :Passenger and staff)
- Earthquake : ①No building collapse (Required), ②Damage to nonstructural member, and risk of damage caused by drop and fall of fixtures and fittings
- Flood : Inundation risk (1/200yrs or 1/100yrs), inundation prevention measure
- Typhoon: No serious structural damage, measures to prevent damages to roof and window by fixed reinforcement and protection of opening

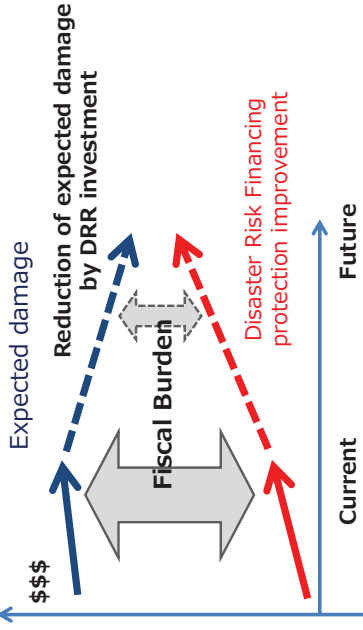
Type	Assessment Item	Assessment Tool	Confirmed by	
			GSIS	DepEd / DPWH
Earthquake	No building collapse caused by hazards in the area non-structural members, drop and fall of fixtures and fittings. With fall prevention measures.	RVS/Seismic diagnosis MEXT Check List	○	●
Flood	No Flood Risk (1/200year rain fall) Flood risk but with inundation prevention measure RC construction building	Risk Tool Site Visit Facility Information	●	△
Typhoon	No damage on the roof No failure in fixing roof plate Institution on the roof including water tank are fixed with structural member No damage to roof plate	Site Visit	●	△

● : Main, ○ : Future Plan, △ : Technical Support

10

8. Disaster Risk Financing and Risk control by DRR

- The Philippines has been formulating the "Disaster Risk Financing & Insurance Strategy" in order to cope with the fiscal burden caused by disasters
- Risk reduction is critical to maintain feasibility of the disaster risk financing
- **Incentive mechanism promoting risk reduction should be directly included to DRF tools such as the property insurance program for public assets.**



Risk reduction for enhancement of Disaster Risk Financing protection level

9

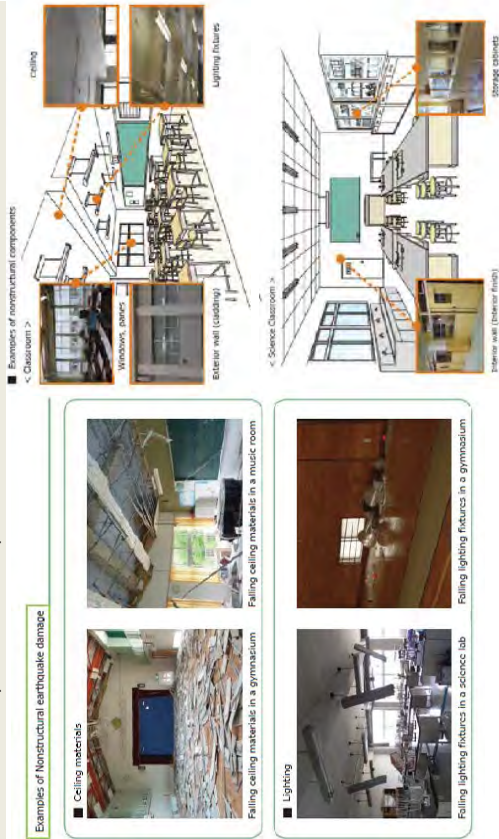
10 Disaster Resilient Certification (Safety of Structure and Seismic Risk)

Rapid Visual Screening by FEMA will be used to assess seismic risk of building structure

11

11. Disaster Resilient Certification (Falling and Damage of Non-structural materials and Seismic Risk)

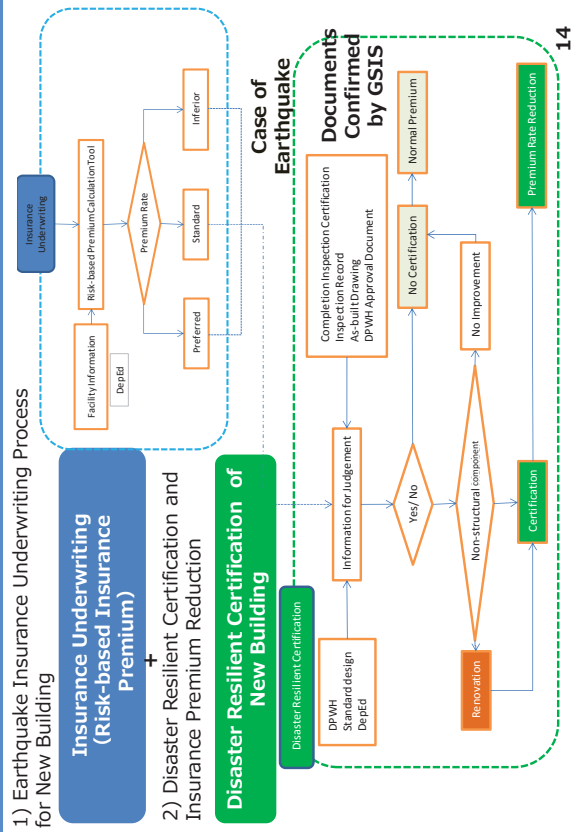
Check List by MEXT* of Japan will be used to assess non-structural material



*MEXT: Ministry of Education, Culture, Sports, Science and Technology

12

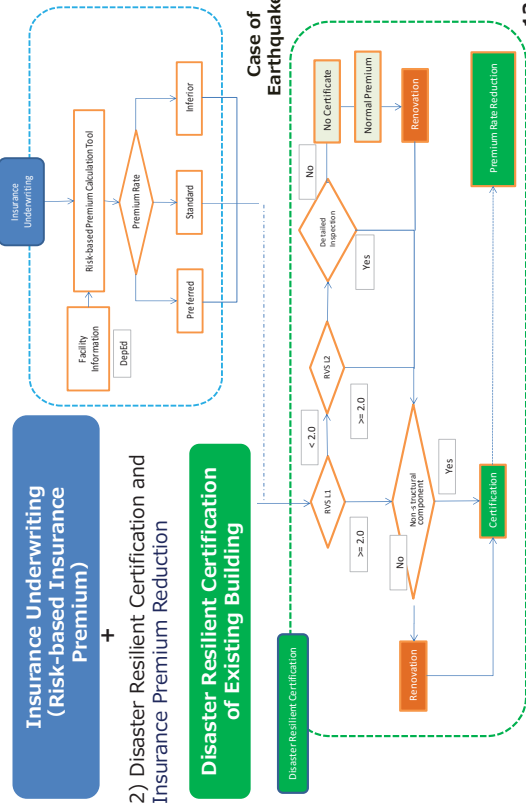
13 Insurance Underwriting and Disaster Resilient Certification Flow (Seismic Risk and Newly Constructed Building)



14

12. Insurance Underwriting and Disaster Resilient Certification Flow (Seismic Risk and Existing Building)

1) Earthquake Insurance Underwriting Process for Existing Building



13

14 Disaster Resilient Certification and Insurance Premium Reduction

Insurance Premium Reduction by Renovation (Applying the latest building standard)

Comparison of Insurance Premium		Earthquake Insurance Premium		Typhoon Insurance Premium		
School ID	School Name	Existing	Renovated	Existing	Renovated	
320607	Simplexio NHS	Taguig	0.470%	0.470%	0.003%	0.003%
136704	Hen Pio Del Pilar ESI	Makati	1.300%	0.490%	31	0.004%
305412	Benignito Aquino HS	Makati	0.620%	0.490%	192	0.010%
136697	Tibagan ES	Makati	0.580%	0.360%	114	0.032%
136745	Salapan ES	San Juan	0.510%	0.310%	125	0.017%
136469	Antonio Maceda IC	Manila	1.330%	0.510%	30	0.017%
136462	Bagong Diva ES	Manila	1.530%	0.580%	26	0.016%
136422	Antonio Luna ES	Manila	0.760%	0.460%	83	0.004%
305315	Victoriano Mapa HS	Manila	1.800%	0.660%	22	0.004%
136800	A. Daeto ES	Vallenuela	0.870%	0.670%	125	0.011%
						73%

15

15. Premium Reduction and Disaster Resilient School Certification

Certification

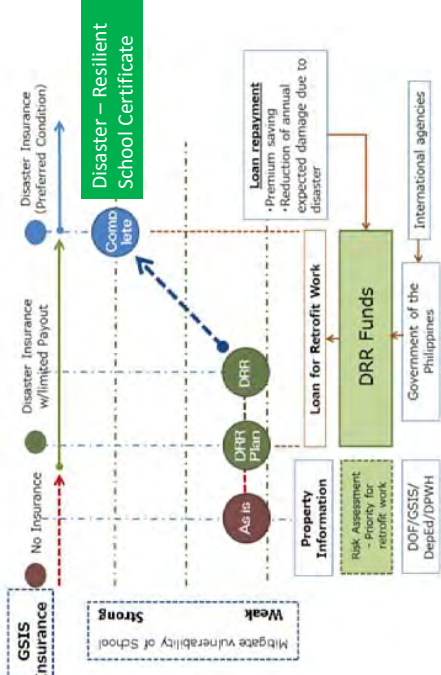
School building will be certified as **Disaster Resilient School** by GSIS, DepEd, or DPWH (in case of new building) when the school building either existing or new, meet disaster resilient conditions



16

16. Disaster Risk Reduction Fund for public schools

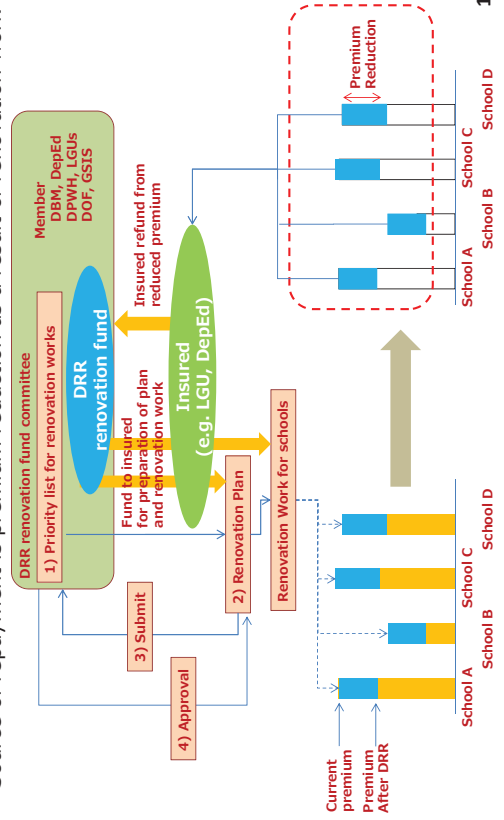
- A renovation fund for the existing school buildings requiring DRR investment.
- Disaster Resilient Certificate works as additional premium reduction mechanism.



17

17. Fund flow

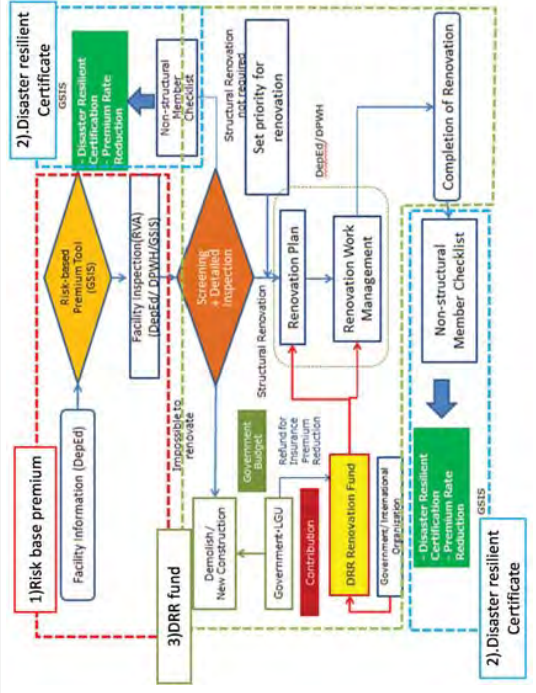
- Renovation work is financed from DRR renovation fund, based on the priority list for renovation work determined by DepEd and DPWH
- Source of repayment is premium reduction as a result of renovation work



18

18. Disaster Resilient Program for Public Schools

DRR process flow



19

1. Risk based premium  **Session 2**

2. Disaster Resilient School Certification

- Since reduced insurance premium alone may not give adequate incentive to the insured, additional incentive should be considered.
- DRS Certification may attract the insured to promote DRR investment as it is closely connected to safety of the building and its occupant, e.g. students in case of school.
- It is rational that GSIS as a property insurer to issue a DRS certification based on their criteria.

Action by GSIS

- ✓ GSIS is to issue DRS certification to a requested school when their building is complied with a check list for DRR certificate program
- ✓ GSIS is to provide reduced premium rate to the requested school once their building is complied with a checklist for DRS certification program

Action by Insured

- ✓ The insured may request GSIS to issue DRS certification when they believe the building meets GSIS's criteria.

3. DRR renovation fund

- Establish a special purpose fund for “renovation work of existing school buildings”. DRR renovation fund should work as a vehicle to enhance DRR investment.
- DRR renovation fund committee consists of DPWH, DBM, DOF, DepEd, LGU and GSIS.

Action by DBM

- ✓ Allocate budget to DRR fund and manage Budget

Action by DRR renovation fund committee

- ✓ Determine a priority list for renovation works.
- ✓ Review and approve a renovation plan
- ✓ Monitor renovation project.

Action by Insured

- ✓ Develop a renovation plan and implement renovation works

Action by GSIS

- ✓ Provide insurance premium reduction and coverage
- ✓ Authorize DRS certification

Wind and flood risk reduction: Damages, countermeasures and efficiency

Kazuyoshi Nishijima

Today's talk

- (1) What are common wind damages to buildings in general and to school buildings in the Philippines in particular?
- (2) What are possible countermeasures to mitigate wind and flood damages to school buildings in the Philippines?
- (3) What are effective countermeasures?

2nd Joint Coordination Meeting,

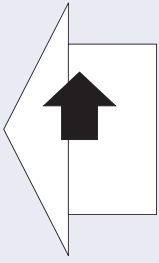
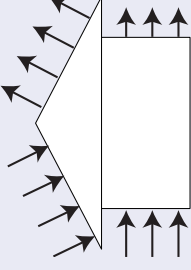
Question

- What are the differences in characteristics of damages to buildings and their causes by earthquake and by strong wind?



(1) Wind damages

Answer (a) to Question

Earthquake loading	Wind loading
Acting on the mass of buildings	Acting on the surface of buildings
	
<ul style="list-style-type: none"> Not easy to reduce the loading → Increasing performance by increasing resistance 	<ul style="list-style-type: none"> Can reduce the loading by changing shape Increasing performance by both increasing resistance and decreasing loading.

Answer (b) to Question

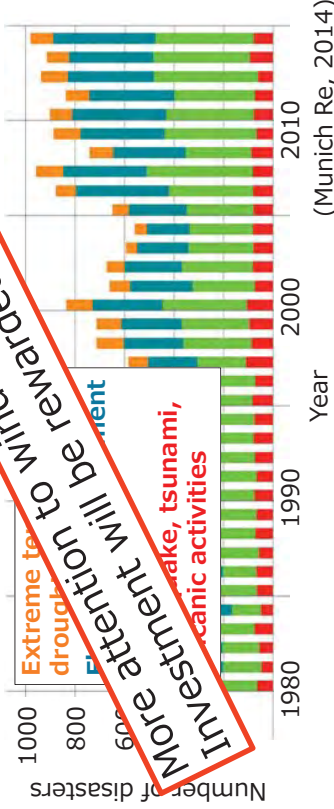
Earthquake damages	Wind damages
Major damages to structural components	Majority of damages to non-structural components
 Courtesy of Dr. Nakafu	
<ul style="list-style-type: none"> Damage reduction requires upgrading of structural performance of components 	<ul style="list-style-type: none"> Relatively easy to reduce those damages. Not much attention to construction of non-structural components.

Answer (c) to Question

Earthquake damages	Wind damages
<ul style="list-style-type: none"> Intense, often fatalities involved. Geographically limited 	<ul style="list-style-type: none"> Often less fatalities involved. Individually less intense Spanning wide areas

More attention to wind damage reduction will be rewarded.

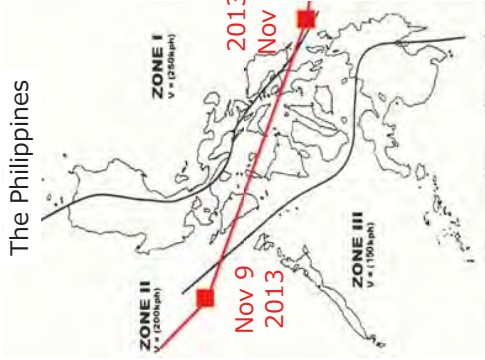
Extreme to drought, flood, drought, pandemic activities



(Munich Re, 2014)

Typhoon Yolanda impact

The Philippines



(Design wind speed map, NSCP 2010)

- Wind speed
 - Est. maximum wind speed: 65 m/s (JMA, 10-minute sustained)
 - Design wind speed: 70 m/s (NSCP Zone I, 3-second gust)

65 · 1.5 ≧ 100 ≧ 70
→ Exceeded design wind speed

- Impacts to infrastructure
 - # Damaged houses: 1,140,332
 - Road/bridges: 15.7 Billion Php
 - Flood control: 1.2 Billion Php
 - Health Facilities: 1.3 Billion Php
 - Schools: 2.3 Billion Php

(NDRRMC as of April 3, 2014)

Examples of wind-induced damages in structures



Factory (large span structures)



Transmission tower



Ordinary house



School building

Common damages to school buildings

(i) Roofing failures



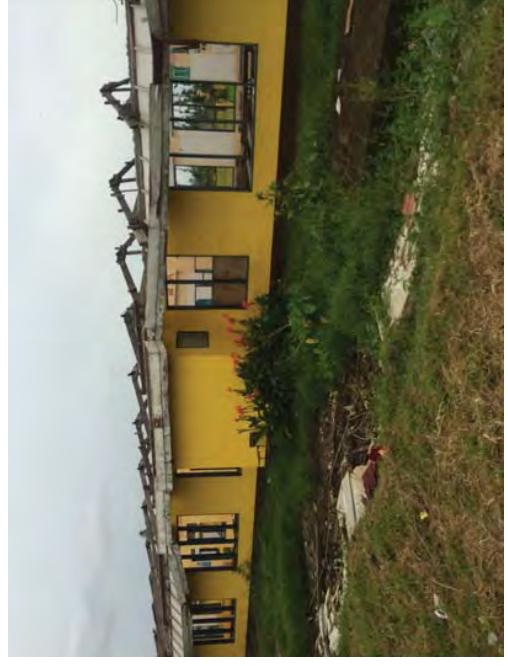
Common damages to school buildings

(ii) Roof structure failures



Common damages to school buildings

(iii) Openings failures



Common damages to school buildings

(iv) Contents damages



Countermeasures

- Prevention
 - Measures to prevent damages from occurrence
- Mitigation
 - Measures to relax the impact of hazards

(2) Countermeasures

Candidates of countermeasures

UNISDR(2009) Guideline Note on Safer School Construction

- W7: Ensure all structural elements are securely connected together and firmly anchored to the foundation
- W10: Roof's slope is between 30 to 45 degrees. (Avoid very low and very steep sloped roofs)
- W11: Avoid wide roof overhangs
- W12: Minimize total height of buildings
- W14: Minimize exterior surface irregularities
- W17: Verandahs should be structurally separated, not have extension roofs attached to the main roof
- W18: Ensure building envelop is securely fastened to structures
- W19: Design building envelop to resist damage by wind-borne debris
- W20: Design doors and windows to resist wind loads
- W21: Brace or secure interior non-structural elements of the building to structural elements.

Countermeasures to wind-induced damages

(i) Roofing failures

Design

- Adoption of hip roof
- Appropriate of finishing of verge
- Avoid wide eaves



Countermeasures to wind-induced damages

(i) Roofing failures

Construction

- Use of appropriate fasteners
- Appropriate pitch of fasteners



Countermeasures to wind-induced damages

(ii) Roof structure failures

Construction

- Appropriate connections: between roof structure elements; between roof structure to walls or columns

Design

- Careful consideration of both strength of structural elements and strength of connections



Countermeasures to wind-induced damages

(iii) Openings failures

Design

- Installation of wind shield

Operation

- Protect windows with wind shield



Countermeasures to wind-induced damages

(iii) Openings failures

Design

- No uncontrolled openings

Operation

- Close all openings in case of typhoon

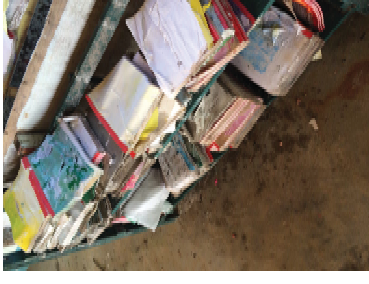


Countermeasures to wind-induced damages

(iv) Contents damages

Operation

- Relocate water-vulnerable materials



Countermeasures to flood-induced damages

(i) Prevention of flood damages

Prevention of inundation to entire site

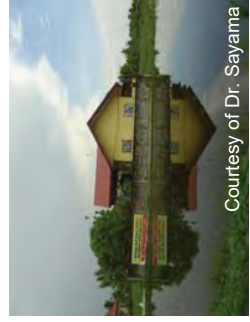
- Raising site ground level
- Installation of flood wall

Prevention of inundation to floor

- Installation of Water-resistant wall
- Water prevention measures to openings
- Pilotti



Courtesy of Dr. Sayama



Courtesy of Dr. Sayama

Countermeasures to flood-induced damages

(ii) Mitigation of flood damages

Buildings

- Prevention measures to determination of walls and rebar.
- Prevention measures to lifting by buoyance

Devices and operation

- Waterproofing or relocation of infrastructure, equipment and important documents
- Measures against electrical shock
- Maintenance of drainage and cleaning



Candidates of countermeasures

UNISDR(2009) Guideline Note on Safer School Construction

- W7: Ensure all structural elements are securely connected together and firmly anchored to the foundation
- W10: Roof's slope is between 30 to 45 degrees. (Avoid very low and very steep sloped roofs)
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(3) Efficiency

Candidates of countermeasures

UNISDR(2009) Guideline Note on Safer School Construction

- W7: Ensure all structural elements are securely connected together and firmly anchored to the foundation
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Candidates of countermeasures

UNISDR(2009) Guideline Note on Safer School Construction

- W11: Avoid wide roof overhangs



Risk-based approach for prioritizing measures

Three components for risk assessment

- Hazard analysis
- **Fragility analysis**
- Consequence analysis

Benefit-cost analysis for prioritization

→ Quantify the expected loss reduction against investment

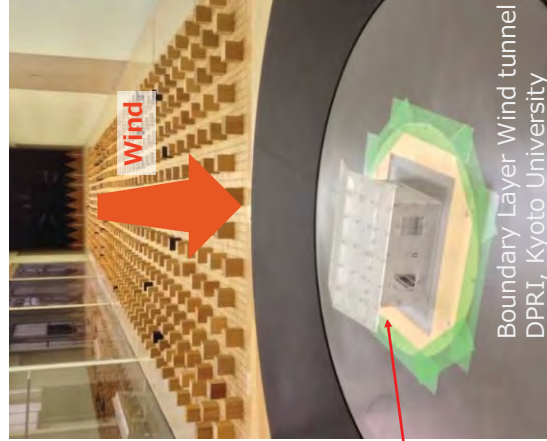
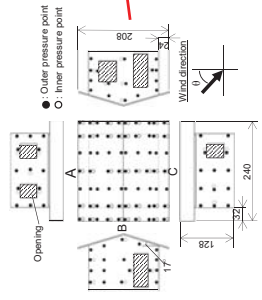
Weak point identification



(This photo was taken in the first survey.)

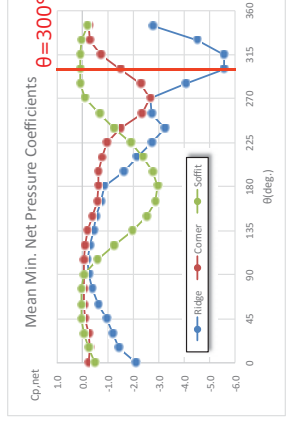
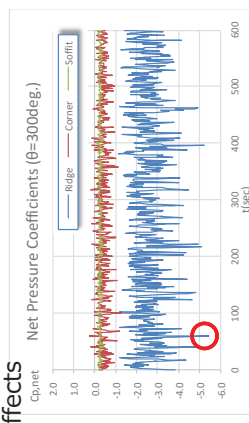
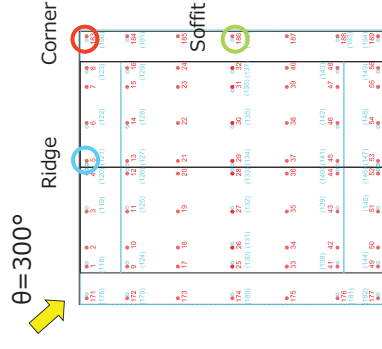
- Roof covering
- Roof-column connection
- Column-foundation connection

Wind tunnel experiment



Wind tunnel experiment

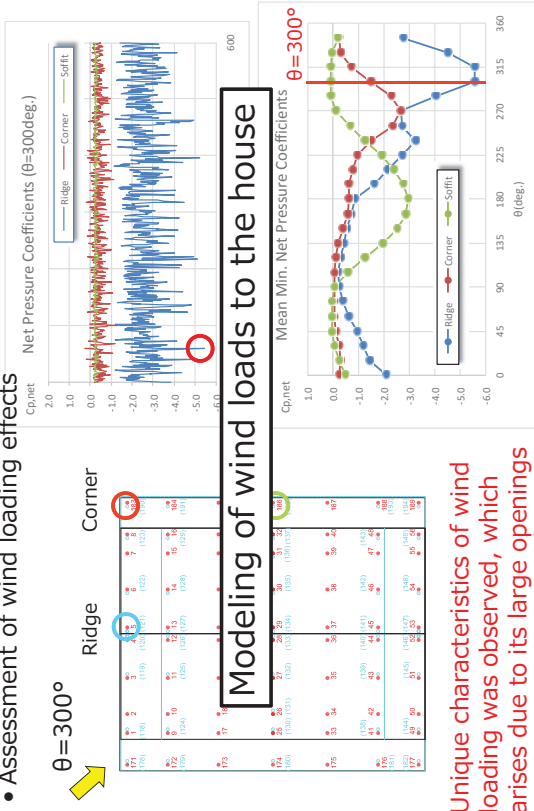
- Assessment of wind loading effects



Unique characteristics of wind loading was observed, which arises due to its large openings

Wind tunnel experiment

- Assessment of wind loading effects

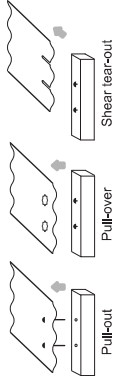


Unique characteristics of wind loading was observed, which arises due to its large openings

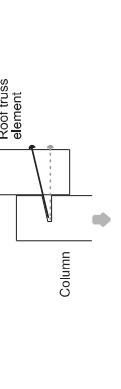
Material tests

- Considered failure modes

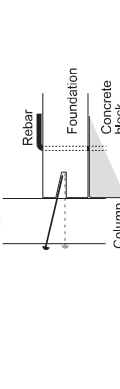
(a) Roof covering failure



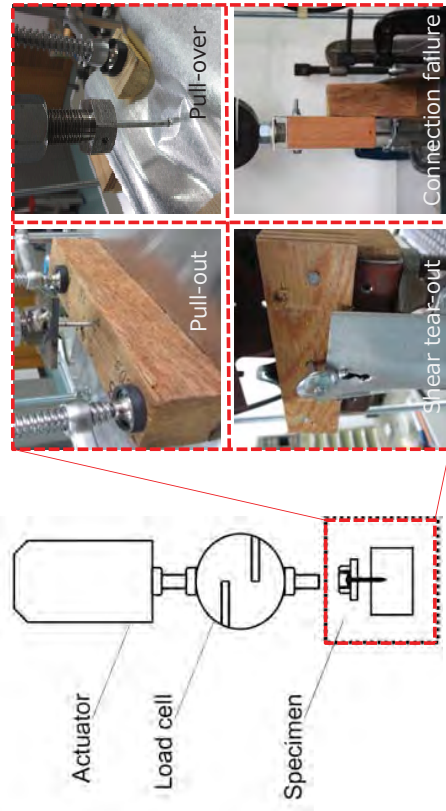
(b) Roof-column connection failure



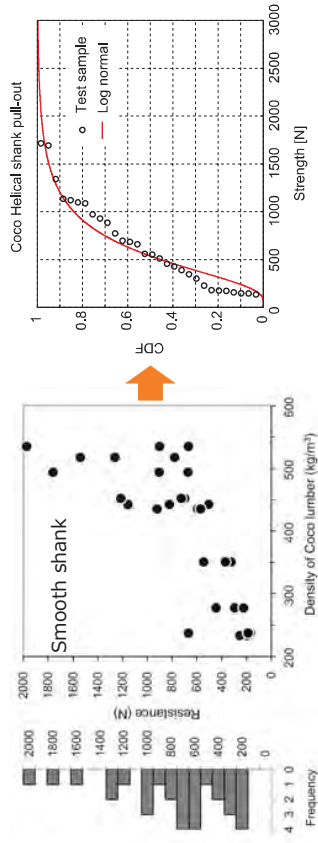
(c) Column-foundation connection failure



Test devices



Resistance modeling



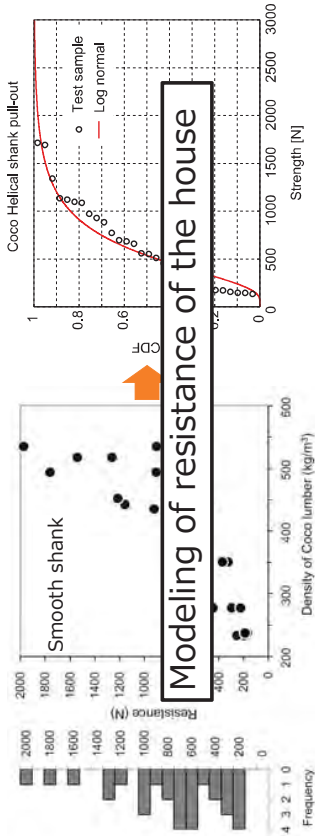
Test result

Resistance changes significantly as a function of coco lumber density

Probabilistic Modeling*

*Not differentiated according to coco lumber density

Resistance modeling



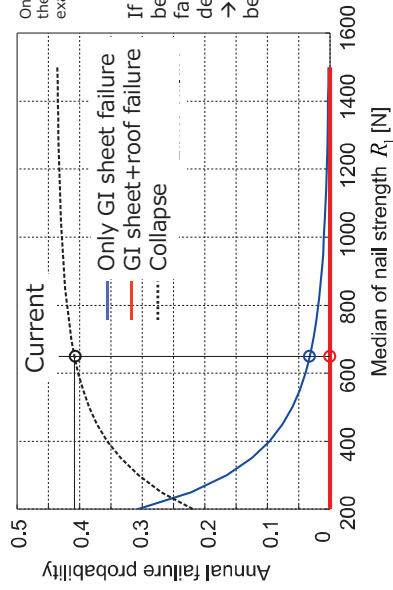
Test result

Resistance changes significantly as a function of coco lumber density

Probabilistic Modeling*

*Not differentiated according to coco lumber density

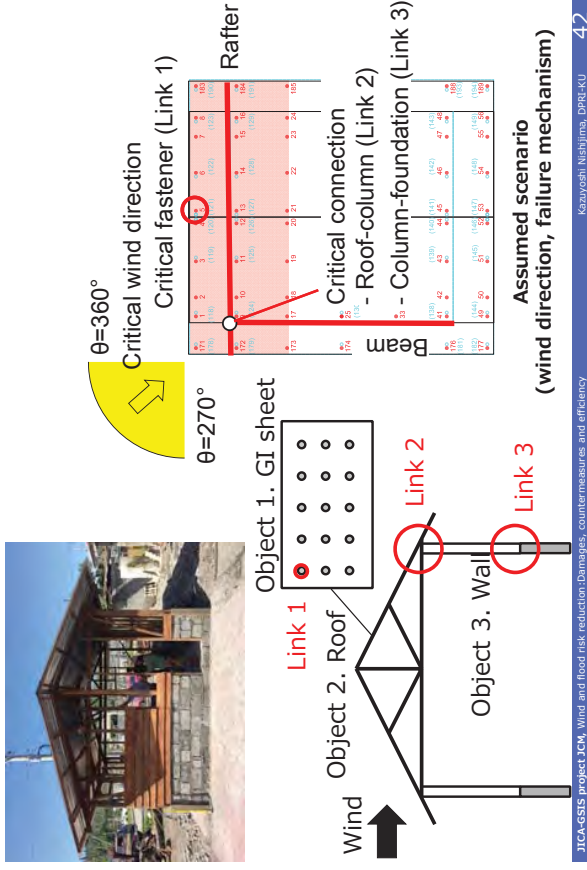
Result



Expected failure time is 5 to 10 years.

➔ By this we can assess the efficiency of measures

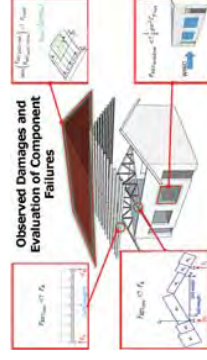
Structural system analysis



Introduction to BBB project in the Philippines

- BBB project conducted by UP Diliman (College of Architecture and Institute of Civil Engineering) lead by Prof. Espina.

UPD-ICE assessed the risk of typical school buildings against strong wind.



UP-Arki developed advanced design of indigenous shelters.



Collaborate with your academia!

The 2nd ICM

Outcome of the JICA Study

Insurance mechanism for incentivizing disaster resilient public infrastructures in Metro Manila

Session 4: Recommendations

March 15, 2017

Session 1

1. Resolve uninsured / underinsurance issues

1) Uninsured issue

Action (GSIS)

- Modification of deductible clause in the policy for natural disaster may make the property insurance more attractive

2) Underinsured issue

a) Conduct insurance valuation for replacement cost by the insured – large public infrastructures

Action (MRT3/NAIA)

- Conduct an insurance valuation for replacement costs every three years using third party appraiser.
- Secure budget for a third party appraisal.
- Secure plans and drawings, bill of quantity of the facility.

b) Conduct insurance valuation for replacement cost by the insured – Public schools

Action (DepEd/DPWH/LGUs)

- A simplified desk-top valuation system should be developed by DepEd, DPWH and with consultation of GSIS
- The insured to estimate replacement cost based on building/floor area, type of structure, occupancy and floor

1

Session 1

1. Resolve uninsured / underinsurance issues

c) Conduct insurance valuation for replacement cost by the insured – General public buildings

Action (DPWH/LGUs)

- DPWH to develop a data base of construction unit price for general public buildings
- The insured to estimate replacement cost based on building/floor area, type of structure, occupancy and floor.

d) Confirmation of a replacement cost by GSIS

Actions (GSIS)

- GSIS verifies that there is no significant difference between sum insured and third party valuation report (infrastructures) and desk-top review report (public school and general public building).
 - ✓ Request the insured to conduct an insurance valuation when no supporting document is available.
 - ✓ Request the insured to adjust the sum insured to reflect the valuation.

2

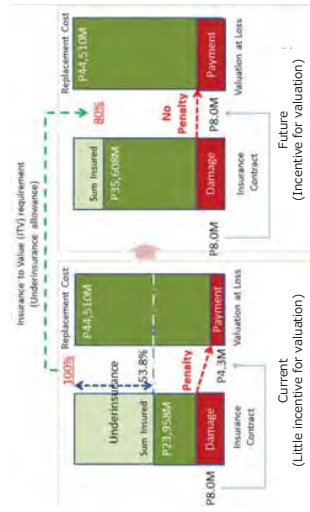
Session 1

1. Resolve uninsured / underinsurance issues

e) Insurance contractual mechanism to promote conducting evaluation of a replacement cost

Action (GSIS)

- Relax current underinsurance requirement from 100%. (e.g. 100% to 80%/90%)
- Instead, the insured is responsible to conduct an insurance valuation
- Consider premium discount as well



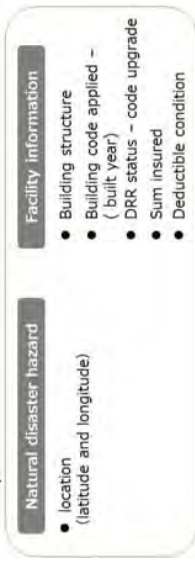
3

Session 2

2. Risk base premium pricing

Introduction of Risk base premium pricing

1. The developed risk tool can provide risk-base premium for all public schools in Metro Manila against natural disasters.
2. The information needed to operate the tool is mostly available at DepEd school inventory data base.



Action by GSIS

- ✓ Revise an insurance application form to include the above mentioned information
- ✓ Input the information into the risk tool according to operation manual

Action by Insured

- ✓ Provide correct information to GSIS

4

Session 3

3:Program to enhance DRR investment

Session 2

1. Risk based premium
2. Disaster Resilient School Certification
 - Since reduced insurance premium alone may not give adequate incentive to the insured, additional incentive should be considered.
 - DRS Certification may attract the insured to promote DRR investment as it is closely connected to safety of the building and its occupant, e.g. students in case of school.
 - It is rational that GSIS as a property insurer to issue a DRS certification based on their criteria.

Action by GSIS

- ✓ GSIS is to issue DRS certification to a requested school when their building is complied with a check list for DDR certificate program
- ✓ GSIS is to provide reduced premium rate to the requested school once their building is complied with a checklist for DRS certification program

Action by Insured

- ✓ The insured may request GSIS to issue DRS certification when they believe the building meets GSIS's criteria.

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Session 3

3:Program to enhance DRR investment

3. DRR renovation fund

- Establish a special purpose fund for "renovation work of existing school buildings". DRR renovation fund should work as a vehicle to enhance DRR investment.
- DRR renovation fund committee consists of DPWH, DBM, DOF, DepEd, LGU and GSIS.

Action by DBM

- ✓ Allocate budget to DRR fund and manage Budget

Action by DRR renovation fund committee

- ✓ Determine a priority list for renovation works.
- ✓ Review and approve a renovation plan
- ✓ Monitor renovation project.

Action by Insured

- ✓ Develop a renovation plan and implement renovation works

Action by GSIS

- ✓ Provide insurance premium reduction and coverage
- ✓ Authorize DRS certification

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Session 3

4. Discussion Topics

1) Comments on Actions to be taken presented by JICA Study Team

- ✓ How to make GSIS insurance scheme more attractive to insured
- ✓ Proper use of 1B peso NDRRMF budget for insurance premium
- ✓ Appropriate form of public assistance from national government for DRR investment (budget allocation/concessional loan from the fund)
- ✓ Possible institutional arrangement for DRR renovation fund

2) Next steps to materialize the study result

- ✓ Next step to resolve uninsured/underinsurance issues
- ✓ Next step to introduce risk based premium tool
- ✓ Next step to realize the program to enhance DRR investment
- ✓ Areas where assistance from development partners is required

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