添付資料２　会議発表資料

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

Program

Chairperson: Dr. Kazutoshi Nishijima,

Topic	Expositor	Time
1.Greetings (9:00-9:10)		
Opening address by the Philippine side	Atty. Maria Obdulia Vitug-Palanca, Senior Vice President, GSIS	9:00 – 9:05
Opening address by Japanese side	Mr. Takahiro Morita, Senior Representative JICA	9:05 – 9:10
2.Introduction (09:10– 09:30)		
P.1 Outline of the JICA Study	Atty. Maria Obdulia Vitug-Palanca, Senior Vice President, GSIS Mr. Takeshi Kuwabara, Leader of JICA Study Team	9:10 – 9:30
3.Outcome of the JICA study (09:30-11:00)		
P.2 Replacement cost review for public schools, NAIA Terminal 3 and MRT3	Mr. Ichiro Kono Member of JICA Study Team	9:30 – 10:00
P.3 Development of Risk-based Premium Calculation Tool for Metro Manila	Dr. Hiroyuki Fujii Sub-leader of JICA Study Team	10:00 – 10:30
P.4 Development of Flood Hazard Map for Metro Manila	Dr. Enrico Paringit, University of the Philippines	10:30 – 11:00
Coffee break		11:00 – 11:20
4. Interactive session (11:20 – 12:00)		
•Possible solutions to address and rectify underinsurance and no-coverage issues •Possible mechanism for incentivizing disaster resilient public infrastructure	Mr. Takeshi Kuwabara, Leader of JICA Study Team	11:20 – 12:00
5. Closing (12:00 – 12:15)	Atty. Maria Obdulia Vitug-Palanca	12:00 – 12:15

Outline of the JICA Study

Insurance mechanism for incentivizing disaster resilient public infrastructures in Metro Manila

November 16, 2016

1. Government Service Insurance System (GSIS)

Mandate of GSIS as the insurer of government properties and interests:

A. Republic Act No. 656 – (16 June 1951) – Property Insurance Law
- Established a Property Insurance Fund in order to indemnify or compensate the Government for any damage to, or loss of, its properties due to fire, earthquake, storm, or other casualty;
- Every government, except a municipal government below first class, is hereby required to insure its properties against any insurable risk. A municipal government below first class may upon application insure its properties with the Fund.

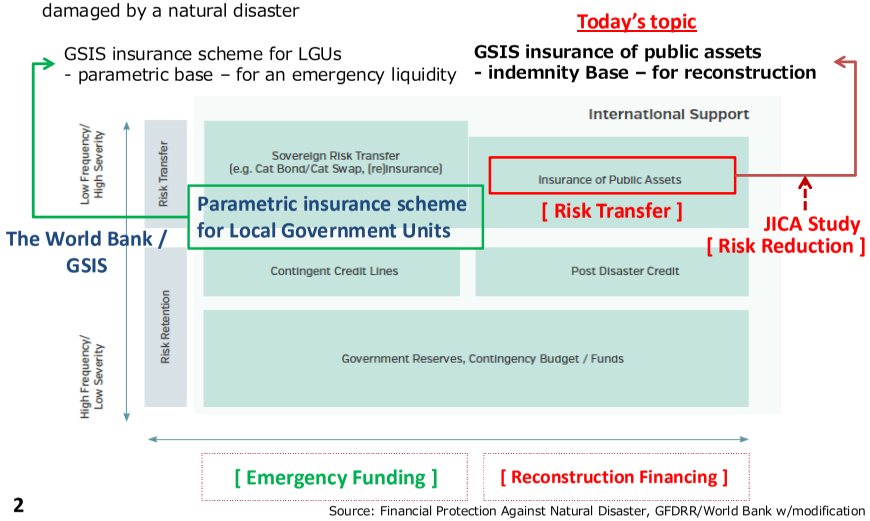
B. Presidential Decree 245 (13 July 1973) – Amending RA 656
- Powers and authority of GSIS, among others, is to engage in the business and operation of all kinds of insurance and reinsurance.

C. Administrative Order 33 (24 August 1987) – Included those properties in which the government has an insurable interest.

D. Administrative Order 141 (12 August 1994) – Properties insured expanded to include insurance risks of the government in privatized corporations as well as Build-Operate-and-Transfer projects.

2. Roles of GSIS in Disaster Risk Finance strategy

1) GSIS insurance schemes are incorporated in the Philippines' Disaster Risk Financing Strategy.
2) A disaster insurance program for LGUs by GSIS, together with the World Bank, is in progress.
3) Insurance of public assets has a critical role for reconstruction financing of the public facilities damaged by a natural disaster



Source: Financial Protection Against Natural Disaster, GFDRR/World Bank w/modification

3. GSIS Insurance Scheme for Public Facilities

1) GSIS provides insurance coverage to assets and properties that have government insurable interests.
2) While this is a compulsory insurance scheme, some of the accounts are uninsured or underinsured.
3) Property insurance is one of reliable financing tools for recovery from natural disaster when it is properly designed and implemented for the purpose.

Issue	Concern	Action
No Insurance No Coverage against Natural Disaster	No insurance payment for reconstruction	LGU is allowed to use DRRM fund for premium to have insurance coverage– Being Implemented by the Government (Premium from National Agency comes from MOE of the Agency) Many of schools are not insured or insured fire only
Underinsurance	Amount of insurance payment is reduced due to underinsurance that results in "inadequate for replacement"	1) Insurance valuation of the facility is needed to establish fair Replacement Cost 2) Change in Awareness to the Insurance
	Currently no effective mechanism to avoid extraordinary underinsurance	

A mechanism to address No Insurance Coverage and Underinsurance issues is needed

4. Insurance of Public Assets – Challenges

No coverage or Inadequacy of insurance

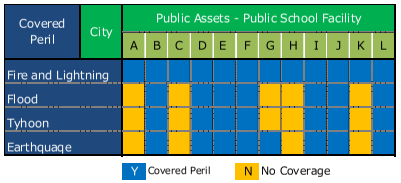
- Despite the requirements by the law, many of the public assets are not insured and no coverage on the natural disaster.
- Many of the public assets are substantially under-insured.

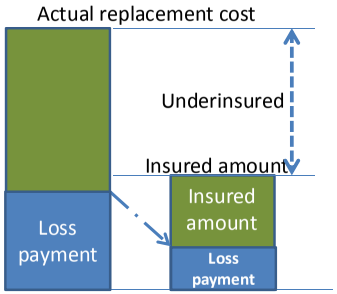
Consequence

- No loss payment if there is no coverage.
- Loss payment is likely to be inadequate if it is underinsured.
- Undermine "Disaster Risk Financing Strategy" as the loss payment is not adequate to cover funding needs for recovery.

Build Back Better

Coverage on natural disasters





Inadequate loss payment

5. Approaches to Solution

Possible solutions

1) Raising awareness of key role of insurance to protect public assets through sharing risk information with the insured.
2) Establishment of a mechanism to avoid underinsurance / adequate insurance valuation for replacement cost.
3) Establishment of incentive mechanisms to enhance Disaster Risk Reduction through GSIS insurance program for public assets.

Adequate valuation of public assets

Case Study for MRT3, Airport T3 and Schools in Metro Manila

Risk–based premium calculation tool

Note: Maximum Foreseeable Loss can be used to determine Limit of Liability

Establish a mechanism to avoid underinsurance

Insurance Program With Adequate Coverage → **Adequate Payment for Recovery after Disaster**

Improving recognition of insurance for public facilities through a Joint Coordinating Meeting

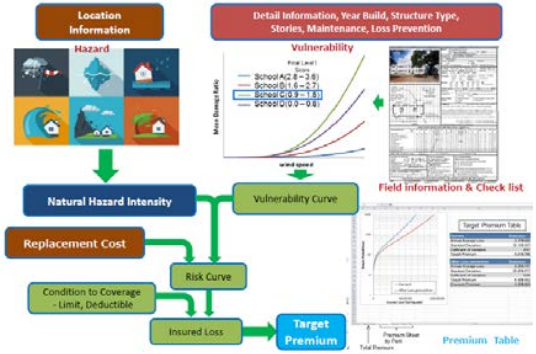
Mechanism to avoid "underinsurance"

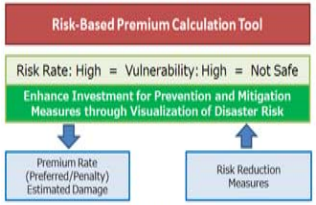
Incentive mechanisms to enhance Disaster Risk Reduction on GSIS' insurance program

6. Risk-based Insurance Premium Tool

Development of a Risk-based Insurance Premium Tool

- A risk-based insurance premium tool that has the function of measuring effect of a loss prevention measures in terms of the estimated damage and insurance premium.



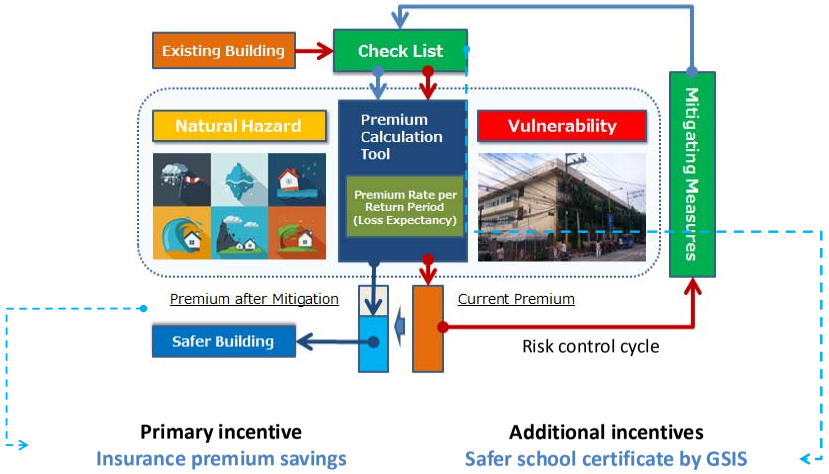


Structure of Risk-based Insurance Premium Tools

- Target perils include Typhoon, Flood, Storm Surge, Earthquake, Liquefaction and Tsunami
- Making use of various hazards and vulnerability data possessed by the Government agencies

7. Incentive Mechanism for Disaster Risk Reduction with the Insurance of Public Assets

- Incentive scheme based on "saving on insurance premium"
- It may need additional incentives to be incorporated into "GSIS insurance program"



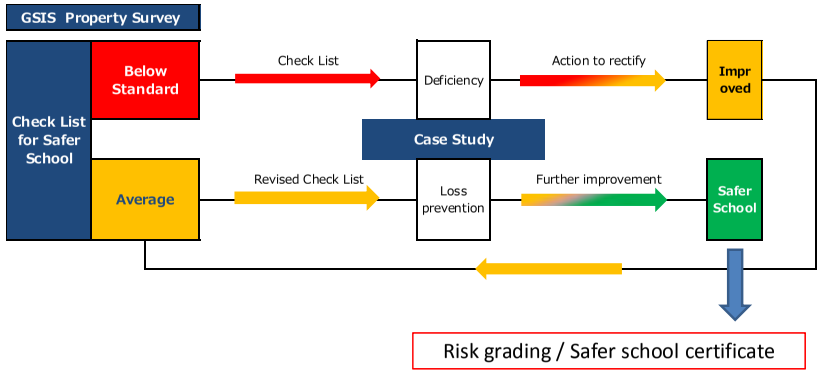
Primary incentive
Insurance premium savings

Additional incentives
Safer school certificate by GSIS
- next slide -

8. Incentive mechanism for Disaster Risk Reduction with the insurance of public schools – existing buildings

Risk improvement practice and cycle

- Utilize a customized check list for safer school buildings
- Identify deficiencies based on the check list
- Action for improvement



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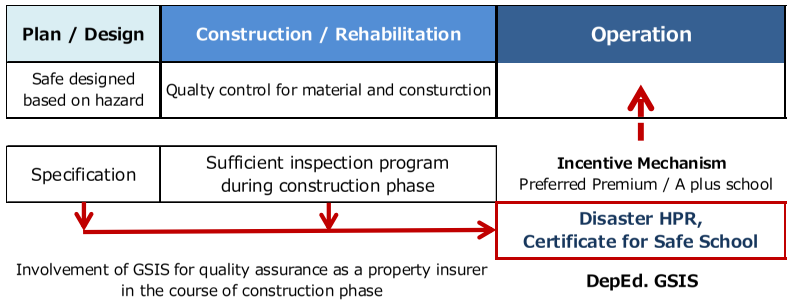
9. Incentive mechanism for Disaster Risk Reduction with the insurance of public schools – construction and renovation phases

Quality assurance in the course of construction / retrofit project

- GSIS becomes a property insurer when construction of the building is completed.
- Quality in design and implementation of construction activities is key for a safe school against natural hazards



- Once the quality requirements are met, GSIS insures the property with preferred premium and issues a safe school certificate.

9

A-18

10. JCM

Outcome of the JICA study (09:30-11:20)

- Replacement cost review for public schools, NAIA Terminal 3 and MRT3
- Development of risk-based insurance premium calculation tool for Metro Manila
- Development of flood hazard map for Metro Manila

Interactive session (11:20 – 12:00)

- Possible solutions to address and rectify underinsurance and no-coverage issues
- Possible mechanism for incentivizing disaster resilient public infrastructure

10

Replacement Costs for MRT 3, NAIA T3 and Public Schools in Metro Manila

Nov 2016

JICA Study Team

1

Replacement Costs for MRT Line 3 and NAIA Terminal 3

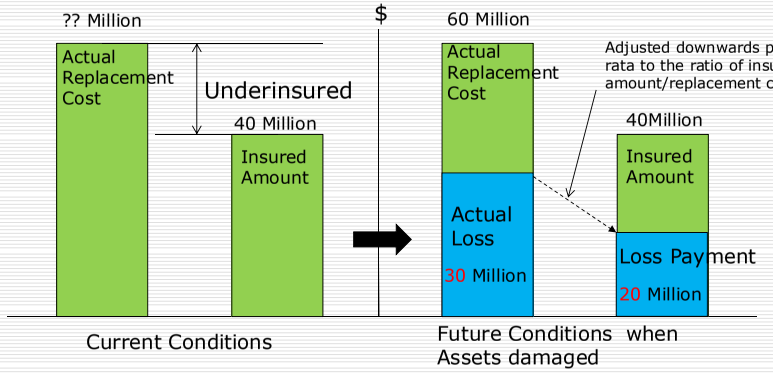
2

Background and Objective

- GSIS is mandated by RA656 with providing insurance for all insurable government assets and interests.
- Under the terms of GSIS's insurance policies, claims are paid based on the replacement value when a loss occurs.
- Some assets and interests are underinsured due to substantial difference between insurable value and actual replacement cost.
- The past acquisition cost is often used for the insurable value when policy is entered, the insurance money paid in such case would be adjusted downwards to provide underinsured in accordance with policy terms.
- As this would lead to a shortfall in funding of recovery work, there is space for improvements to be made to the functioning of disaster insurance.
- Replacement costs for MRT Line3, NAIA T3, Public Schools, insured by GSIS, were estimated in this study.

3

Problems of Under Insurance



- Loss payment is inadequate for reconstruction
- Time consuming for payment settlement of insurance claim.

- Which leads to inadequate and delayed recovery from natural disaster.

4

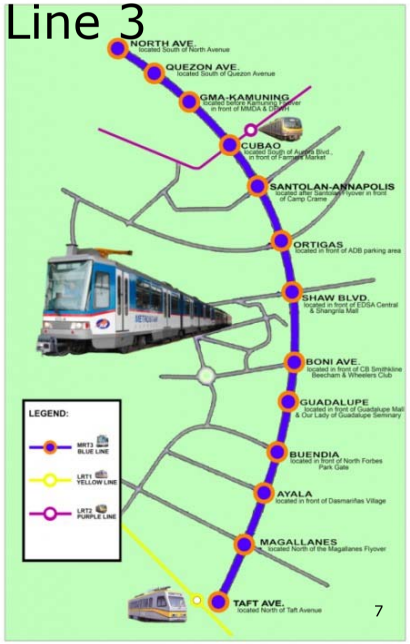
Methods of Costing

- Costing Works are subcontracted out to "Langton & Seah Philippines(L&S)" , well known cost management and quantity surveying firm, which was merged with ARCADIS in 2012.
- JICA Study team has handed out available information such as "as built drawings" in Jun to L&S together with conducting site inspection in August 2016.

Metro Rail Transit (MRT) Line 3

- Construction began in October 1996 by Metro Rail Transit Corporation (MRTC) and further supervised by DOTC and SYSTRA, French consultancy firm.
- The line generally runs along the north and south lanes of EDSA and spans 16.9 km of at-grade, underground and elevated tracks.
- The Depo building is situated near the North Avenue Station and a total of 13 stations are distributed on the entire length of the train network.
- MRT Line 3 started full operations in year 2000 serving an average 500,000 passengers on a daily basis to date.

Metro Rail Transit Line 3



MRT Line3 Assets

- Thirteen (13) Stations
- Track Section: 16.9km
  - At Grade 3,712m, Elevated 11,248m, Underground: 1,943m
- Depot Maintenance Building including entrance and approach track
- Viaduct and Bridges
- Trains: Light Rail Vehicle 121 nos

Replacement Cost of MRT Line3

Item	Description	Total Cost
A	**Build Value**	
1	Original Works	
1.1	Stations	3,790,179,576
1.2	Track Sections	18,606,542,222
1.3	Depot Maintenance Building	5,150,119,618
1.4	Viaducts and Guideways	366,537,248
1.5	Steel Bridges	420,333,897
1.6	Trains	6,357,083,334
		34,690,795,895
2	Additional Works	
2.1	Retrofitting and Refurbishment Works	162,600,000
	Sub Total (Php)	**34,853,395,895**
B	**Miscellaneous**	
	Contingencies (10%)	3,485,339,590
	Additional Cost Allowance (10%)	3,485,339,590
	(Design, Consultancy and Professional Fees, etc.)	
	Total (Php)	**41,824,075,075**
	Track Length(km)	16.9
	Total Cost/Track Length(Php/km)	2,474,797,342
	Total (USD)	**871,334,897**
	Track Length(km)	16.9
	Total Cost/Track Length(USD/km)	51,558,278

Comparison with Insured Sum in GSIS Policy

Item	Unit	Current GSIS Insurance Policy	Current Replacement Cost	Rate of Under Insurance
Insured Sum	Php	23,958,144,000	**41,824,075,075**	**57%**
Track Length	km		16.9	
Unit Construction Rate	Php/km		2,474,797,342	
	USD/km		51,558,278	

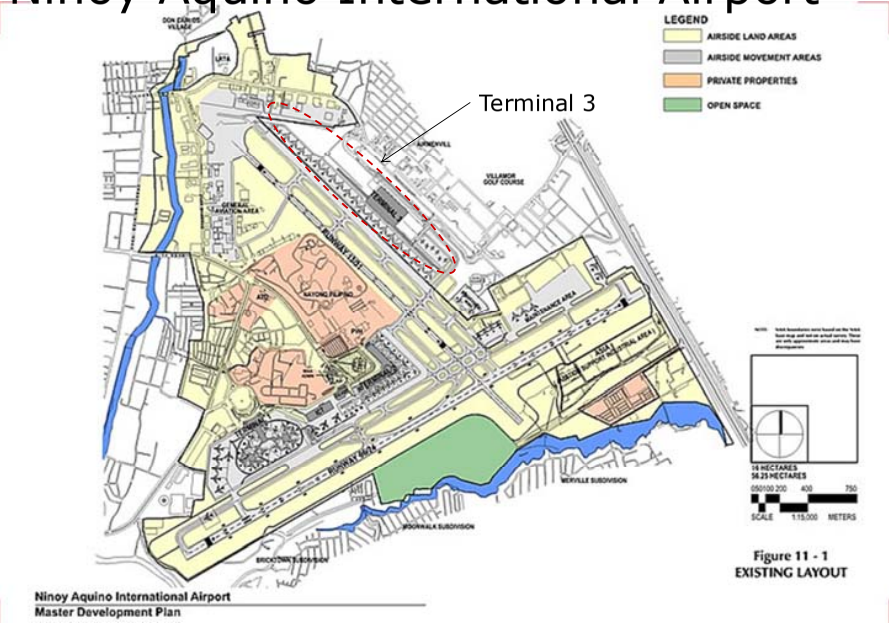
Php48=IUSD

- Insured sum is 57 % of replacement costs.
- Sub limit of 5.5 Billion Php is set in case of loss caused by natural disaster.

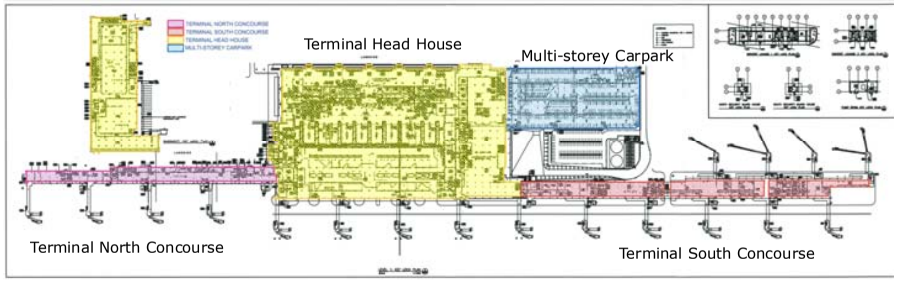
NAIA Terminal 3

- Ninoy Aquino International Airport (NAIA) Terminal 3; the most recently constructed in the NAIA Complex.
- Designed by Skidmore, Owings and Merril to have capacity of 13 million passengers per year.
- Construction begin in 1997 with the terminal officially opening to selected domestic flights in 2008.
- Rehabilitation under the Japanese Contractor to improve its facilities and utilize hole terminal and completed in 2014.
- The terminal building is now a gateway for domestic and international travelers with total floor area of approximately 180,000 m2.

Ninoy Aquino International Airport



NAIA Terminal 3 Assets



All NAIA Terminal 3 Assets which includes infrastructure works such as aprons, airside, landside, multi-storey carparks and buildings.

Item	Description	Overall Cost Total Cost (Php)
A	**Build Value**	
1	Original Works	
1.1	General Conditions and Preliminaries (10%)	2,421,088,734
1.2	Site Development	408,789,872
1.3	Terminal North Concourse	997,550,094
1.4	Terminal South Concourse	1,589,246,467
1.5	Terminal Head House	7,999,238,684
1.6	Multi-story Car Park	744,766,906
1.7	Speciality Systems	5,897,884,532
1.8	Airside Infrastucturel Works	1,998,032,118
1.9	Landside Infrastrucure Works	1,361,857,392
		23,418,454,799
2	Additional Works	
2.1	Retrofitting and Refurbishment Works	3,213,521,270
	Sub Total (Php)	**26,631,976,069**
B	**Miscellaneous**	
	Contingencies (10%)	2,663,197,606
	Additional Cost Allowance (10%)	2,663,197,606
	(Design, Consultancy and Professional Fees, etc.)	
	Total (Php)	**31,958,371,281**
	Construction Floor Area:CFA (m2)	256,164
	Total Cost/CFA(Php/m2)	124,757
	Total (USD)	**665,799,402**
	Construction Floor Area:CFA (m2)	256,164
	Total Cost/CFA(USD/m2)	2,599

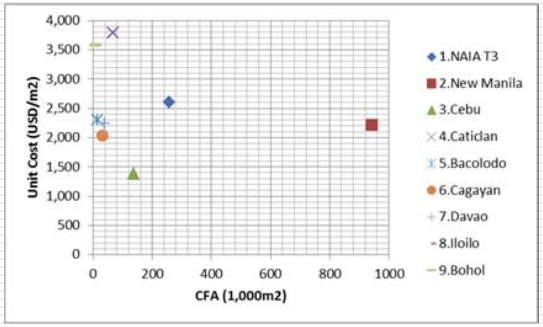
Comparison with Insured Sum in GSIS Policy

Item	Unit	Current GSIS Insurance Policy	Current Replacement Cost	Rate of Under Insurance
Insured Sum	Php	7,880,530,246	31,958,371,281	25%
Cnstruction Floor Area (CFA)	m2		256,164	
Unit Construction Rate	Php/m2		124,757	
	USD/m2		2,599	

Note:Php48=1USD

Comparison with Other Airport

Airport	CFA (m2)	Total Cost (Php)	Unit Cost (Php/m2)	Total Cost (USD)	Unit Cost (USD/m2)
1.NAIA Terminal 3	256,164	31,958,371,281	124,757	665,799,402	2,599
2.Proposed New Manila International Airport	942,252	100,437,121,894	106,593	2,092,440,039	2,221
3.Mactan Cebu International Airport	137,610	9,155,904,420	66,535	190,748,009	1,386
4.Proposed Caticlan International Airport	66,475	12,074,511,390	181,640	251,552,321	3,784
5.Bacolodo Airport	15,319	1,694,827,000	110,636	35,308,896	2,305
6.Cagayan Airport	30,194	2,952,292,000	97,777	61,506,083	2,037
7.Davao Airport	37,697	4,050,509,000	107,449	84,385,604	2,239
8.Iloilo Airport	28,987	2,876,894,000	99,248	59,935,292	2,068
9.Bohol Airport	6,059	1,042,622,000	172,078	21,721,292	3,585



Conclusion for MRT Line3 and NAIA Terminal3

- Replacement cost for MRT Line 3 is around 41.8 Billion Php, But Insured Sum in current GSIS Insurance Policy is 24.0 Billion Php which is around 57% of estimated replacement cost.
- Replacement cost for NAIA Terminal 3 is around 32 Billion Php, But Insured Sum in current GSIS Insurance Policy is 7.9 Billion Php which is around 25% of estimated replacement cost.

Replacement Cost for Public Schools

Background and Objectives

- GSIS is mandated by RA656 with providing insurance for all insurable government assets and interests.
- Many of the public schools under jurisdiction of DepEd are not insured.
- Many of Public the schools under jurisdiction of Local Government are insured but some buildings are underinsured since the past construction cost is often used for the insurable value when policy is entered.
- Replacement costs for the public schools both by DepEd and Local Government are calculated based on the current design and unit costs in this study.
- Difference of Replacement costs and Insured Value are examined for future discussion.

Public Schools in Metro Manila

	Name of LGUs	Number of Schools			
		Total	w/ GSIS Insurance		w/o GSIS Insurance
1	Manila	106	83	78%	23
2	Quezon City	142	140	99%	2
3	Pasay City	32	26	81%	6
4	Caloocan City	88	0	0%	88
5	Mandaluyong City	29	5	17%	24
6	Marikina City	31	0	0%	31
7	Makati City	37	35	95%	2
8	Pasig City	40	31	78%	9
9	City of San Juan	9	8	89%	1
10	Paranaque City	32	4	13%	28
11	Las Piñas City	32	0	0%	32
12	Valenzuela City	58	0	0%	58
13	Malabon City	40	0	0%	40
14	Navotas	21	0	0%	21
15	Taguig	44	8	18%	36
16	Muntinlupa City	26	18	69%	8
	Total	767	358	47%	409

Complete Public School List in MM by DepED school list

Division	Total Number of Schools	Total Number of Buildings	Total Number of Storeys	Total Number of Classrooms
1Manila	106	479	1,193	7,069
2Quezon City	142	858	2,055	7,098
3Pasay City	32	195	405	1,817
4Caloocan City	88	554	1,216	3,798
5Mandaluyong City	29	112	329	1,830
6Marikina City	31	126	310	1,438
7Makati City	37	64	233	2,245
8Pasig City	40	265	1,022	3,672
9San Juan City	9	52	95	416
10Paranaque City	32	108	273	1,280
11Las Piñas City	32	150	333	1,108
12Valenzuela City	58	251	590	1,889
13Malabon City	40	204	343	999
14Navotas	21	128	211	641
15Taguig	44	288	616	1,902
16Muntinlupa City	26	193	399	1,275
Grand Total	**767**	**4,027**	**9,623**	**38,477**

GSIS Insured School List

Received on March 2016 through JICA

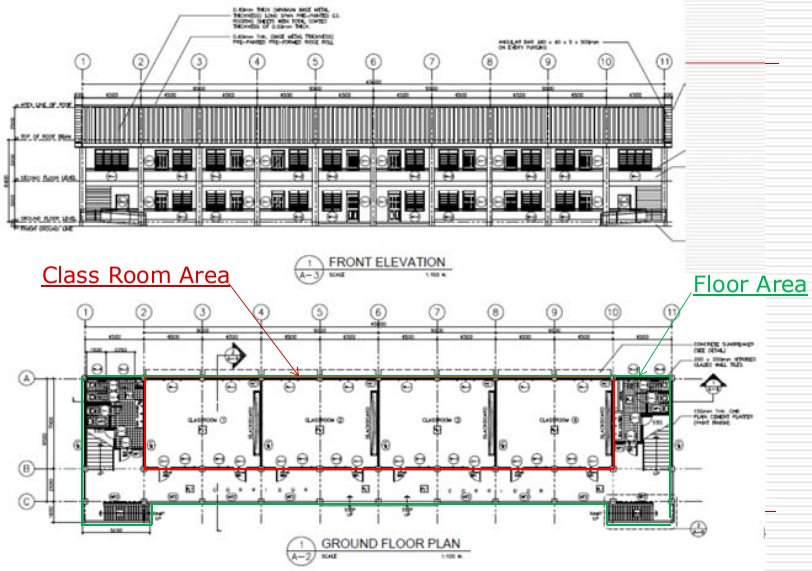
Name of City		Type of School	No	Sum Insued Php	Premium Php/year	Premium Rate %	Perils
1	Manila	Public Elementary School	63	1,017,952,740	3,792,790	0.3726%	F/L, EQ,TYP,FLD, EC
		Public High School	22	290,226,153	1,081,354	0.3726%	F/L, EQ,TYP,FLD, EC
2	Quezon	Public Elementary School	95	4,663,491,246	3,432,330	0.0736%	F/L
		Public High School	45	3,206,700,798	2,360,132	0.0736%	F/L
3	Pasay	Public Elementary School	19	671,168,200	2,141,027	0.3190%	F/L, EQ, TYP, FLD
		Public High School	9	742,170,645	2,367,524	0.3190%	F/L, EQ, TYP, FLD
4	Caloocan						
5	Mandaaluyong	Public Elementary School	5	179,484,728	658,709	0.3670%	F/L, EQ,TYP, FLD,
6	Marikina						
7	Makati	Public Elementary School	30	2,499,891,821	6,639,713	0.2656%	F/L, EQ,
		Public High School	13	1,283,973,687	3,410,234	0.2656%	F/L, EQ
8	Pasig	Elementary School	31	942,536,265	4,047,469	0.4294%	F/L,TYP,EQ,EC
		Public High School	8	333,770,277	1,394,519	0.4178%	F/L,TYP,EQ,EC
9	San Juan	Public Elementary School	8	275,000,000	202,400	0.0736%	F/L,
10	Paranaque	Public Elementary School	2	26,848,000	30,875	0.1150%	F/L,
		Public High School	2	69,576,000	80,012	0.1150%	F/L,
11	Las Piñas City						
12	Valenzuela City						
13	Malabon						
14	Navotas						
15	Taguig	Public Elementary School	10	92,320,870	67,948	0.0736%	F/L, EQ,TYP,FLD, EC
16	Muntinlupa	Public Elementary School	13	209,055,000	928,204	0.4440%	F/L, EQ, TYP, FLD
		Public High School	5	178,000,000	790,320	0.4440%	F/L, EQ, TYP, FLD
Total		Elementary School	276	10,577,748,870	21,941,465	0.207%	
		High School	104	6,104,417,560	11,484,095	0.188%	
		Total	380	16,682,166,431	33,425,560	0.200%	

Note: F/L: Fire and Lightening; EQ: Earthquake; TYP: Typhoon; FLD: Food; EC: Extended Coverge (Falling aircraft, Vehicle impact and so on)

Calculation of Replacement Cost for Pubic Schools

- Calculation Method
  - Replacement Cost
    1. To construct same size of buildings (same number of class rooms)
    2. Cost will be calculated by Unit cost(PHP/m2) x total building floor area(m2) according to DPWH standard design drawings
    3. Unit cost was calculated from DepED standard construction cost/floor area.

DPWH Standard Design: Two storeys, 8 Class rooms,



DepED Standard Construction Cost

Source: Education Facility Division of DepED

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF EDUCATION

Cost Comparison of School Buildings

SINGLE STOREY	DepED COST (5% VAT, 22% IC)	PAGCOR DESIGN COST
1 classroom	1,012,049.65	
2 classrooms	1,814,740.17	3,045,822.85
3 classrooms	2,640,828.12	4,182,436.13
4 classrooms	3,464,886.58	5,313,780.76
5 classrooms	4,273,392.24	6,333,226.22
6 classrooms	5,036,544.64	7,357,880.62

TWO STOREY	DepED COST (5% VAT, 17% IC)	PAGCOR DESIGN COST
2 classrooms	4,422,048.49	No Data Available
4 classrooms	6,160,798.08	8,452,340.56
6 classrooms	8,075,291.28	10,814,623.06
8 classrooms	10,813,386.61	14,744,047.17
10 classrooms	12,723,662.56	17,031,301.39
12 classrooms	14,447,404.35	No Data Available

THREE STOREY	DepED COST (5% VAT, 17% IC)	PAGCOR DESIGN COST
3 classrooms	6,869,914.85	No Data Available
6 classrooms	10,360,088.48	No Data Available
9 classrooms	15,458,157.20	23,207,431.54
12 classrooms	18,660,225.43	27,766,227.66
15 classrooms	21,923,843.03	32,458,050.84
18 classrooms	25,497,559.98	37,073,257.77

FOUR STOREY	DepED COST (5% VAT, 17% IC)	PAGCOR DESIGN COST
8 classrooms	14,819,916.37	No Data Available
12 classrooms	22,107,847.77	28,618,646.52
16 classrooms	26,678,453.91	33,871,440.32
20 classrooms	31,099,362.44	39,084,503.88
24 classrooms	35,613,164.12	44,513,497.44
28 classrooms	40,105,307.06	No Data Available
32 classrooms	44,590,061.86	No Data Available

Source: Educational Facilities Division (EFD) as of March, 2018

Simplified Unit Construction Cost per m2

Description	Construction Cost (PHP/m²)	M&E (PHP/m²)	Total (PHP/m²)
One-Story	11,000	1,100	12,200
Two-Story	13,000	1,300	14,300
Three-Story	14,700	1,500	16,200
Four-Story	15,300	1,500	16,800

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A-25

Calculation of Replacement Cost for Public Schools (by Buildings)

School Name & Building Type	W (m)	L (m)	Number of Storey	Number of Rooms	Unit Room Area (m2)	Total Room Area (m2)	Con. Factor	Estimated Total Floor Area (m2)	Unit Construction Cost (PHP/m2)	Estimated Replacement Cost by Bldgs (PHP)
	①	②	③	④	⑤=①x②	⑥=④x⑤	⑦	⑧=⑥x⑦	⑨	⑩=⑧x⑨
A. C. Herrera Elementary School										
3 Storey Reinforced Building Type 1	7.0	6.0	3	21	42	882	1.82	1,604	16,200	25,987,046
Barrio Obrero Elementary School										
Deped School Building (Standard)	7.0	9.0	3	9	63	567	1.82	1,031	16,200	16,705,959
Practice House	8.0	10.0	1	1	80	80	1.28	102	12,200	1,247,937
Hele Building	7.0	8.0	3	9	56	504	1.82	917	16,200	14,849,741
Rc Building	7.0	9.0	4	72	63	4,536	1.66	7,549	16,800	126,822,330
Reading Center	5.0	10.0	1	1	50	50	1.28	64	12,200	779,961
Mtbl Building	7.0	8.0	2	6	56	336	1.80	605	14,300	8,650,911
Mla. Jaycees Building	6.5	8.5	2	2	55	111	1.80	199	14,300	2,845,017
Ptca Building	7.0	7.0	1	1	49	49	1.28	63	12,200	764,362
F. G. Calderon Integrated School										
Deped School Building (Standard)	7.0	9.0	4	100	63	6,300	1.66	10,485	16,800	176,142,127
Lapu-Lapu Elementary School										
Deped School Building (Modified)	7.0	9.0	3	24	63	1,512	1.82	2,750	16,200	44,549,221
Antonio Luna Elementary School										
Learning And Public Use Schoolbuilding (Lapus)	7.0	9.0	2	12	63	756	1.80	1,361	14,300	19,464,550
Havana Type	6.0	8.0	3	18	48	864	1.82	1,571	16,200	25,456,698
Mariano Ponce Elementary School										
Deped School Building (Modified)	7.0	7.0	2	20	49	980	1.80	1,764	14,300	25,231,825
Feeding Room	6.0	5.0	1	1	30	30	1.28	38	12,200	467,977
Deped School Building (Modified)	7.0	7.0	2	20	49	980	1.80	1,764	14,300	25,231,825

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Comparison of Replacement Cost and Sum Insured (By Schools)

Sl No	Division Name	School ID	School Name	Total Replacement Cost by Schools (PHP)		Sum Insured by GSIS (PHP)	%
1	Manila	136418	A. C. Herrera Elementary School	25,987,046	25,987,046	16,149,518	62%
2	Manila	136419	Barrio Obrero Elementary School	172,666,219	172,666,219	12,952,282	8%
3	Manila	136420	F. G. Calderon Integrated School	176,142,127	176,142,127	3,130,714	2%
4	Manila	136421	Lapu-Lapu Elementary School	44,549,221			
5	Manila	136422	Antonio Luna Elementary School	44,921,248	44,921,248	3,297,507	7%
6	Manila	136423	Mariano Ponce Elementary School	50,931,626	50,931,626	9,753,332	19%
7	Manila	136424	Melchora Aquino Elementary School	66,823,837			
8	Manila	136425	Plaridel Elementary School	89,823,184	89,823,184	16,446,000	18%
9	Manila	136426	Francisco Benitez Elementary School	161,995,490	161,995,490	7,848,595	5%
10	Manila	136427	Lakan Dula ES	111,253,925	111,253,925	294,570	0%
11	Manila	136428	Gregoria de Jesus ES	95,685,520	95,685,520	11,766,807	12%
12	Manila	136429	Librada Avelino ES	29,660,267	29,660,267	11,407,604	38%
13	Manila	136430	Arsenio H. Lacson Elementary School	47,642,919			
14	Manila	136431	T. Paez Integrated School (Elem.)	111,085,230	111,085,230	9,552,906	9%
15	Manila	136432	J. P. Rizal Elementary School	161,465,857	161,465,857	13,945,945	9%
16	Manila	136433	Emilio Jacinto Elementary School	174,344,950			
17	Manila	136434	Gen. Vicente Lim Elementary School	196,965,861	196,965,861	56,101,147	28%

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Summary of Replacement Costs and Sum Insured in MM(by LGs)

	Name of LGUs	Number of Schools			Replacement Cost (PHP)			%
		Total	w/ GSIS Insurance	w/o GSIS Insurance	All Schools	Schools w/ Insured Sum Data	Insured Sum (PHP)	
1	Manila	106	83	23	13,923,104,379	11,166,006,154	1,289,950,930	11.6%
2	Quezon City	142	140	2	12,047,106,608	12,001,498,861	7,859,420,237	65.5%
3	Pasay City	32	26	6	3,405,833,368	2,985,694,508	1,319,737,147	44.2%
4	Caloocan City	88	0	88	6,262,852,863	0	0	-
5	Mandaluyong City	29	5	24	3,285,781,008	660,908,619	179,484,728	27.2%
6	Marikina City	31	0	31	2,402,620,785	0	0	-
7	Makati City	37	35	2	4,322,120,141	3,761,752,024	3,013,523,113	80.1%
8	Pasig City	40	31	9	6,099,722,276	4,359,855,903	1,022,383,144	23.4%
9	City of San Juan	9	8	1	759,231,018	589,435,401	258,832,924	43.9%
10	Paranaque City	32	4	28	2,382,531,317	655,538,244	96,424,000	14.7%
11	Las Piñas City	32	0	32	1,803,390,524	0	0	-
12	Valenzuela City	58	0	58	3,131,265,862	0	0	-
13	Malabon City	40	0	40	1,540,540,028	0	0	-
14	Navotas	21	0	21	938,776,268	0	0	-
15	Taguig	44	8	36	3,211,800,327	691,277,984	75,061,827	-
16	Muntinlupa City	26	18	8	2,313,456,625	1,869,588,917	387,055,000	20.7%
	Total	**767**	**358**	**409**	**67,830,133,398**	**38,741,556,613**	**15,501,873,050**	**40.0%**

Note: Some buildings are not insured even in a same school according to GSIS

Conclusion for Public Schools

- There are 767 schools in MM and Total replacement cost is 67.8 Billion PHP.
- Among them, 358 schools are insured and replacement cost of them is 38.7 Billion PHP.
- Insured Sum by GSIS for 358 schools is 15.5 Billion PHP which is 40% of replacement Costs for insured schools and 23% of all the schools in Metro Manila.

Note: Replacement cost is calculated based on the DPWH standard design and standard cost. Insured sum may not cover all the buildings especially for DepED financed buildings.

Development of risk-based insurance premium calculation tool for Metro Manila

November 16th, 2016

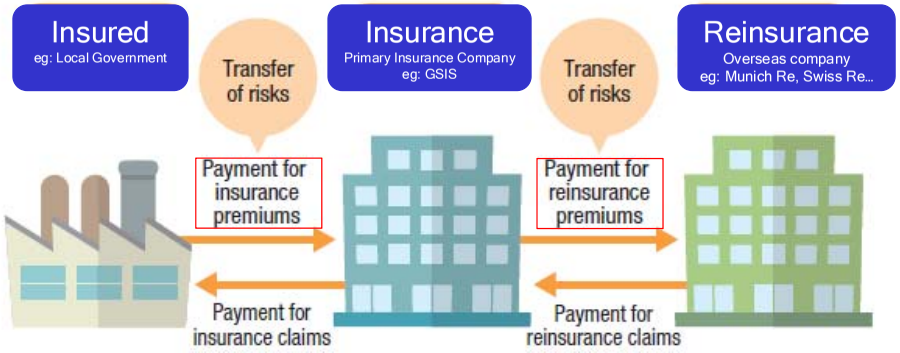
A-27

What is insurance?

Insurance is one of the traditional risk transfer methods. Re/insurance companies underwrite an insured's Risks and determine insurance premium.

Re/Insurance companies need to collect adequate insurance premiums for adequate insurance payment

→How to calculate adequate premium?



How to get adequate premium?

Re/Insurance company need to understand the risk for each insurance product monetary base.

- Statistics Pricing

If Re/Insurance company have a lot of insurance loss data, they can understand the risk using statistic approach. Statistic Loss Analysis can show us the annual average Loss and volatility by each insurance product.

eg: Motor insurance, Fire insurance….

- Model based Pricing

Statistical approach cannot take into account "Low-frequency High-severity Catastrophe''. Major Re/Insurance company use Natural Catastrophe model based on science and engineering.

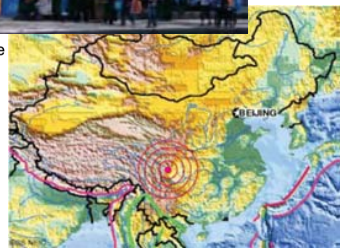
eg: Property insurance

What is Catastrophe Model?

What is Catastrophe Model?

Catastrophe(Cat) Model:
- To determine potential losses from natural disaster
- Probabilistic approach

Sichuan Earthquake



Hurricane Gustav

CAT Model Framework

Hazard Module

Define severity & frequency of stochastic event

Modeling severity and frequency of Earthquake or Typhoon, by analyzing historical data

Where is it?
How big is it?

Vulnerability Module

Calculate loss to event

Modeling relationship between hazard and building damage (dependent on hazard type or building details)

Financial Module

Applying (re)insurance condition

Finally calculates entire losses (re)insures have

Exposure Information

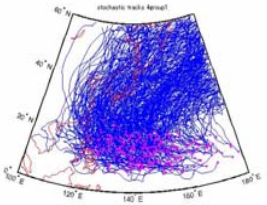
Input data to Cat model

Outline of NatCat Model

Typhoon events

Generation / Track module

How many typhoons occur?
Where does a typhoon occur?
Which direction does the typhoon step?

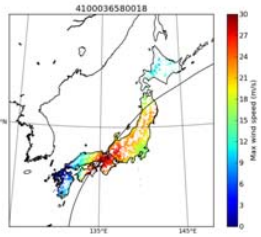


- Genesis model
- Track model

Hazard Severity

Wind speed evaluation module

What is a wind speed on a certain site?

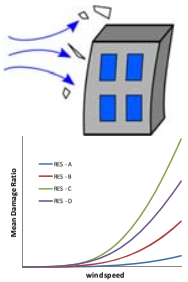


- Pressure model
- Gradient wind model
- Surface wind model

Loss Estimation

Vulnerability module

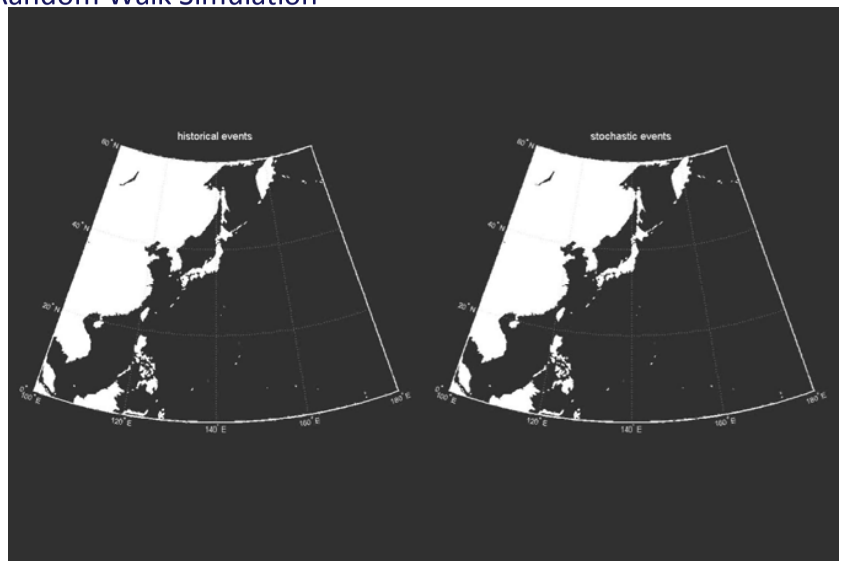
What is the damage level and loss amount due to a typhoon?



- Vulnerability model

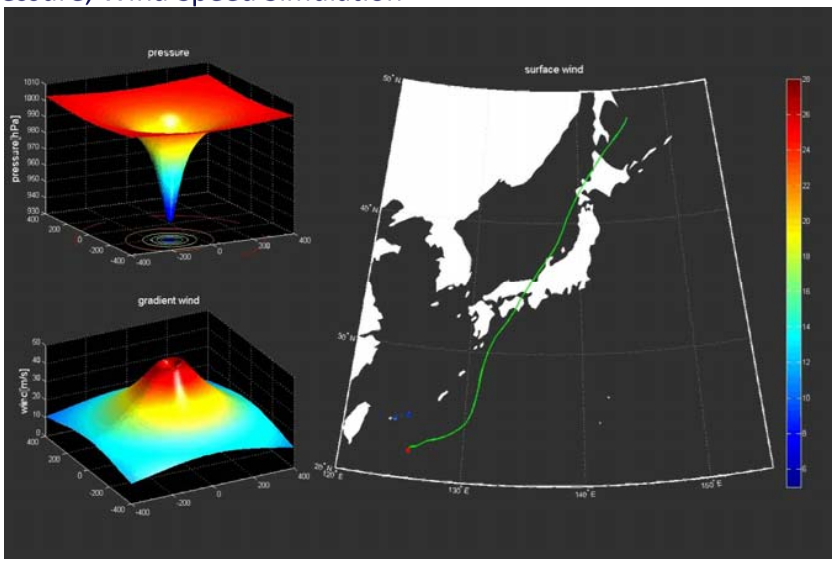
Typhoon modeling

Random Walk Simulation



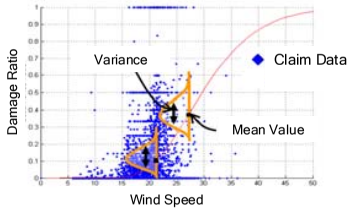
Typhoon modeling

Pressure, Wind Speed Simulation

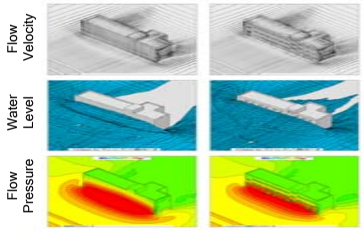


Vulnerability Module

Statistical Approach

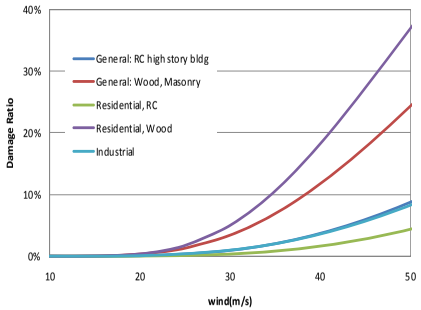


Engineering Approach



Vulnerability Curve

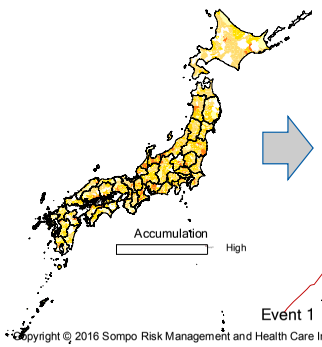
Example: Damage ratio - Wind Speed relationship



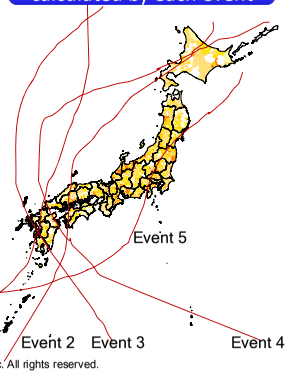
Modeling Input and Output

Input: Exposure information
- Geographic location (spatial distribution of contract; state, county…)
- Insured Value by Coverage (Bldg, Cont, BI) and by Location
- Attributes (Construction, Year Built, Height of Bldg, Occupancy, ….)
- Financial Information (Deductibles, Limits, Reinsurance scheme, ….)

Exposure data input



Modelled Loss is calculated by each event



Event Loss Table (ELT)

Event ID	Freq.	Mean Loss	Standard Deviation
1	0.00050	1,000,000	1,005,000
2	0.00250	500,000	170,000
3	0.00020	2,000,000	1,365,000
4	0.00015	3,000,000	1,875,000
5	0.00010	5,000,000	2,085,000
6	…	…	…
7	…	…	…

Modeling Input and Output –statistics-

Exceedance Probability curve (EP curve) can be generated by arranging Event Loss Table in descending order. Re/Insurance company use EP Curve for their Risk accumulation control.

Exceedance Probability Curve

(**)Value at Risk is defined as the threshold value such that the probability that the loss over the given time horizon exceeds this value.

Value at Risk Table

Return Period(Year)	VaR(PHP)
10000	500,000,000
5000	450,000,000
1000	300,000,000
500	250,000,000
250	190,000,000
200	160,000,000
100	120,000,000
50	95,000,000
20	55,000,000
10	35,000,000
pure premium	**14,000,000**
Standard Deviation	**30,000,000**

(*) Return period: 1/exceedance probability

Catastrophe Pricing Model

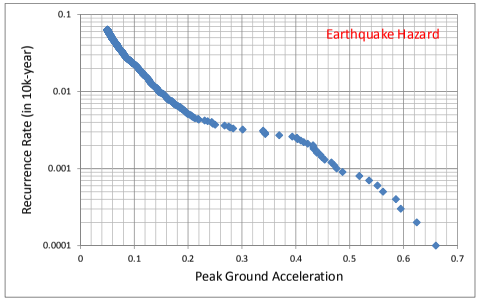
JICA study team develops Proto type pricing model based on NatCat Risks
Target Region : Metro Manila
Target Perils : Earthquake, Typhoon, Flood, Storm Surge, Tsunami,
Landslide, Liquefactions

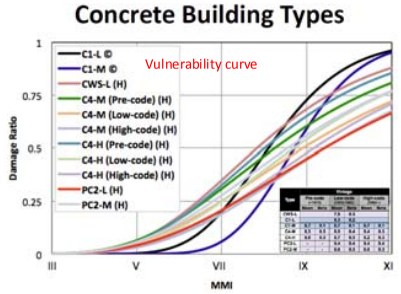
Source Data

Hazard : AIR, Air World Wide, Provided Earthquake, Wind, Tsunami, Storm Surge Data. UP is developing Flood Hazard map

Vulnerability: UP provided Vulnerability curve

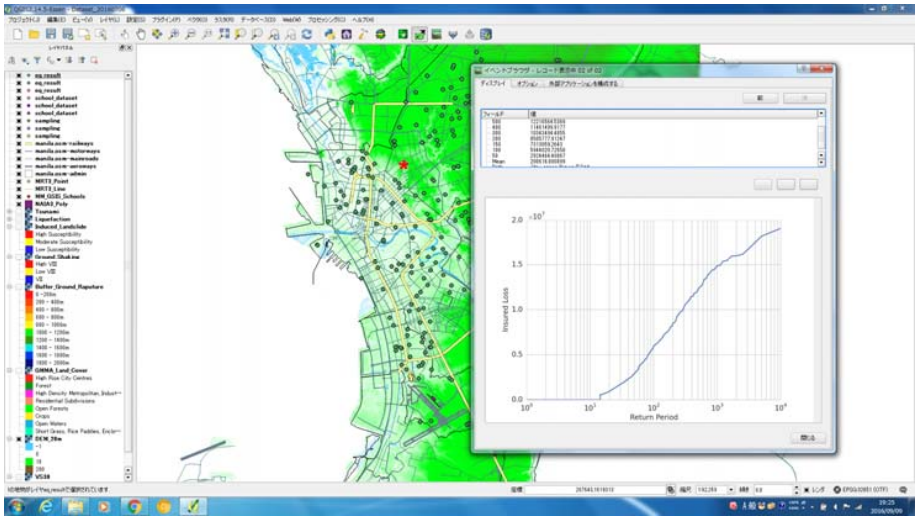
Exposure: School (Location, Sum Insured: GSIS)
MRT3 (MRT3)
AirPort Terminal 3 (NAIA)





Platform

GIS(Geographic information system)



Pricing Results

Construction Reinforced Concrete
Year built: 1972-1992 story: 3-7

School ID	Replacement Cost	Annual Average Loss(php)	Premium Rate	Return Period(Year)(php)								
				1000	500	250	200	100	50	25	20	10
S1	11,040,000	74,907	0.679%	5,686,909	5,167,238	3,610,065	2,902,781	1,805,372	929,286	373,250	263,458	87,224
S2	3,680,000	36,381	0.989%	1,822,060	1,568,622	1,284,975	1,171,298	865,498	469,058	231,877	165,454	59,162
S3	31,100,000	316,361	1.017%	15,444,213	13,290,439	10,928,624	10,027,877	7,431,908	4,074,186	2,042,290	1,456,704	530,655
S4	29,600,000	268,336	0.907%	14,122,126	12,066,893	9,794,891	9,113,202	6,634,145	3,475,124	1,683,467	1,187,204	408,238
S5	3,800,000	33,719	0.887%	1,843,973	1,566,134	1,261,611	1,153,564	838,428	437,481	208,127	148,477	49,645
S6	7,000,000	64,357	0.919%	3,542,170	3,084,852	2,400,128	2,129,152	1,561,851	821,489	384,010	276,783	97,139
S7	8,700,000	78,825	0.906%	4,426,151	3,853,100	3,039,305	2,651,410	1,928,498	1,002,895	463,968	334,094	114,612
S8	29,000,000	267,120	0.921%	14,608,475	12,593,087	10,084,146	8,851,147	6,528,301	3,441,292	1,614,397	1,156,689	396,280
S9	4,750,000	43,171	0.909%	2,408,386	2,099,055	1,659,203	1,445,403	1,053,938	549,929	256,272	185,010	63,497
S10	13,500,000	112,091	0.830%	6,859,363	5,934,289	4,480,356	3,992,107	2,821,391	1,418,087	643,697	449,921	150,387
S11	2,750,000	22,213	0.808%	1,375,757	1,207,166	883,419	799,644	563,646	279,950	124,675	86,611	29,592
S12	62,462,278	508,458	0.814%	31,167,343	27,380,234	20,021,365	18,206,329	12,731,603	6,432,452	2,882,446	2,008,495	690,691
S13	15,459,640	127,105	0.822%	7,863,430	6,804,552	5,181,038	4,554,683	3,230,633	1,585,875	726,114	507,217	167,247
S14	8,000,000	69,826	0.873%	3,983,848	3,495,133	2,657,843	2,393,063	1,710,916	896,764	411,166	296,782	102,003
S15	29,110,000	240,720	0.827%	14,444,726	12,707,374	9,365,896	8,523,384	5,937,559	3,059,545	1,389,373	989,214	339,756
S16	41,261,000	355,491	0.862%	20,403,566	17,960,392	13,601,515	12,275,933	8,775,173	4,583,673	2,080,504	1,505,240	517,854
S17	67,925,367	570,728	0.840%	33,486,000	29,488,815	22,002,589	19,884,439	13,969,471	7,276,410	3,344,741	2,358,285	834,150
S18	63,755,247	489,258	0.767%	32,012,966	28,120,408	20,279,647	17,929,379	12,112,536	6,111,011	2,669,254	1,843,610	633,719
S19	58,236,426	391,884	0.673%	29,306,740	25,745,396	17,564,190	15,131,144	10,204,623	4,674,104	1,957,013	1,309,823	423,377
S20	54,250,000	390,827	0.720%	27,356,314	24,009,185	17,072,447	14,766,421	9,879,209	4,814,063	2,031,377	1,381,215	466,458
S21	59,300,000	472,993	0.798%	29,652,915	26,069,502	18,922,600	17,031,780	11,674,817	6,007,729	2,669,414	1,848,462	641,415
S22	72,588,435	669,324	0.922%	42,009,658	40,010,324	26,234,062	22,451,647	13,972,336	8,416,034	3,591,947	2,715,162	1,128,335
S23	100,234,453	678,834	0.677%	53,184,648	49,631,945	31,554,946	25,970,747	15,440,132	8,369,144	3,115,891	2,320,224	831,596
S24	122,000,000	699,837	0.574%	59,077,154	55,239,514	33,257,302	28,031,539	16,082,731	8,564,061	3,058,009	2,238,200	767,409
S25	87,244,574	534,625	0.613%	43,060,131	39,809,333	25,060,032	21,128,295	12,462,680	6,430,357	2,449,085	1,789,412	613,966
S26	80,158,228	563,107	0.702%	43,260,646	40,337,814	25,894,326	21,279,951	12,885,518	6,993,168	2,616,847	1,964,475	705,633

Premium Rate(EQ) =EQ Annual average Loss / Replacement Cost

Insurance Premium Incentive

After the school's retrofit work, Pure Premium will be decreased by approximately 40%.

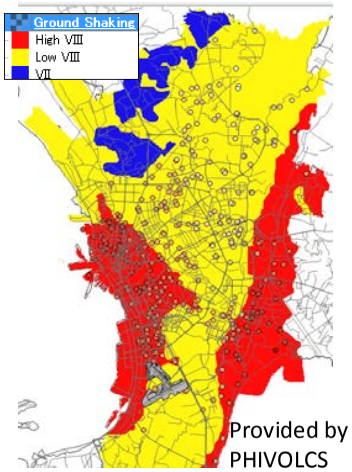
Construction Reinforced Concrete
Year built: 1972-1992 story: 3-7

Year built 1992-

School ID	Before Retrofit: Replacement Cost	Before Retrofit: Annual Average Loss(php)	Before Retrofit: Premium Rate	After Retrofit: Annual Average Loss(php)	After Retrofit: Premium Rate	Insurance Premium Incentive(php) Before- After	%Decrease (Before- After)/ /Before
S1	11,040,000	74,907	0.679%	46,366	0.420%	28,541	38.1%
S2	3,680,000	36,381	0.989%	22,425	0.609%	13,956	38.4%
S3	31,100,000	316,361	1.017%	195,087	0.627%	121,274	38.3%
S4	29,600,000	268,336	0.907%	164,784	0.557%	103,552	38.6%
S5	3,800,000	33,719	0.887%	20,728	0.545%	12,991	38.5%
S6	7,000,000	64,357	0.919%	39,686	0.567%	24,670	38.3%
S7	8,700,000	78,825	0.906%	48,663	0.559%	30,162	38.3%
S8	29,000,000	267,120	0.921%	164,761	0.568%	102,359	38.3%
S9	4,750,000	43,171	0.909%	26,640	0.561%	16,531	38.3%
S10	13,500,000	112,091	0.830%	69,100	0.512%	42,990	38.4%
S11	2,750,000	22,213	0.808%	13,681	0.497%	8,532	38.4%
S12	62,462,278	508,458	0.814%	312,972	0.501%	195,486	38.4%
S13	15,459,640	127,105	0.822%	78,396	0.507%	48,709	38.3%
S14	8,000,000	69,826	0.873%	42,981	0.537%	26,846	38.4%
S15	29,110,000	240,720	0.827%	147,975	0.508%	92,745	38.5%
S16	41,261,000	355,491	0.862%	218,629	0.530%	136,862	38.5%
S17	67,925,367	570,728	0.840%	350,471	0.516%	220,257	38.6%
S18	63,755,247	489,258	0.767%	301,006	0.472%	188,252	38.5%
S19	58,236,426	391,884	0.673%	241,522	0.415%	150,362	38.4%
S20	54,250,000	390,827	0.720%	240,773	0.444%	150,054	38.4%
S21	59,300,000	472,993	0.798%	290,902	0.491%	182,091	38.5%
S22	72,588,435	669,324	0.922%	417,179	0.575%	252,146	37.7%
S23	100,234,453	678,834	0.677%	421,245	0.420%	257,589	37.9%
S24	122,000,000	699,837	0.574%	429,222	0.352%	270,615	38.7%
S25	87,244,574	534,625	0.613%	328,586	0.377%	206,039	38.5%
S26	80,158,228	563,107	0.702%	350,321	0.437%	212,786	37.8%

Pricing Results - All Stochastic EQ Event (Averaged View)-

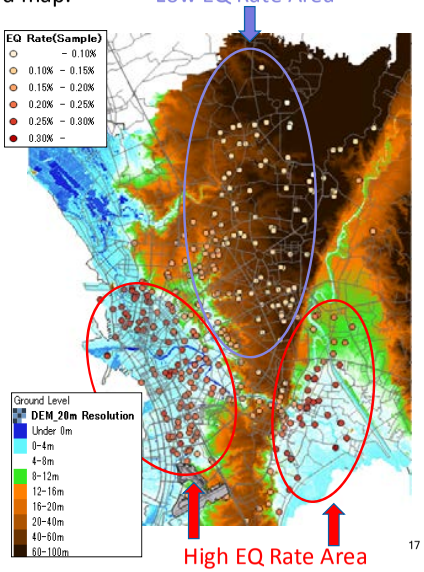
Right Figure shows the EQ Rate on the map drawn by calculation tool's results. EQ premium rate consistent with PHIVOLCS's hazard map.



Provided by PHIVOLCS

Premium Rate(EQ) =
EQ Annual average Loss / Replacement Cost

Low EQ Rate Area



High EQ Rate Area

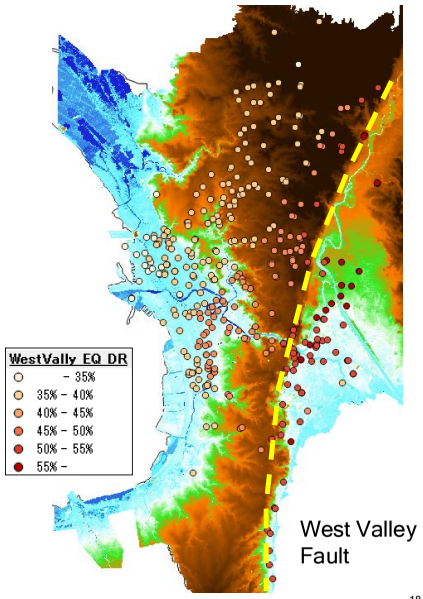
Pricing Results – West Valley Fault Event -

Right Figure shows the EQ Damage Ratio by West Valley Fault event.

Serious school damaged are estimated around West Valley Fault.

If West Valley earthquake occurred, many schools will collapse and public government need to rebuild many schools.

We should retrofit many public schools to protect children from Natural Disasters.



West Valley Fault

Flood Modeling and Mapping Study for Metro Manila

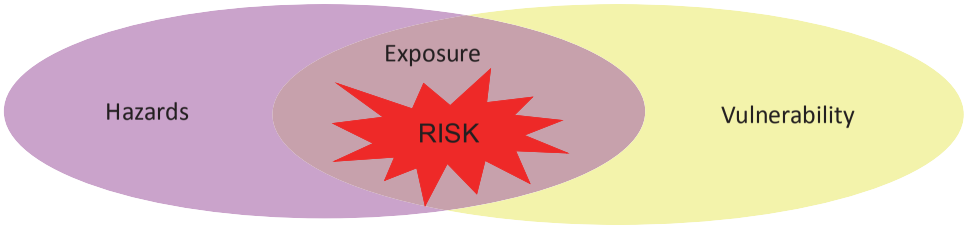
Flood Model Component

November 16, 2016

Outline

- Hazards and Risks
- Objectives
- Watershed Boundaries
- DEM and Model
- Boundary Conditions imposed
- Flood Model Results
- Flood Maps

From Hazards to Risks



Risk	=	Hazards	x	Vulnerability
The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.		A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.		The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

"How much do floods cost"?

Statistical Data on Typhoon Oriented Flooding in 1990 - 2012

No. of Occurrence	Casualties			Affected Population	Houses Damaged		Estimated Damage (PHP million)
	Dead	Injured	Missing		Totally	Partially	
221	18,035	20,914	6,093	109,243,360	1,860,992	5,529,468	294,783

Source: OCD-NDRRMC

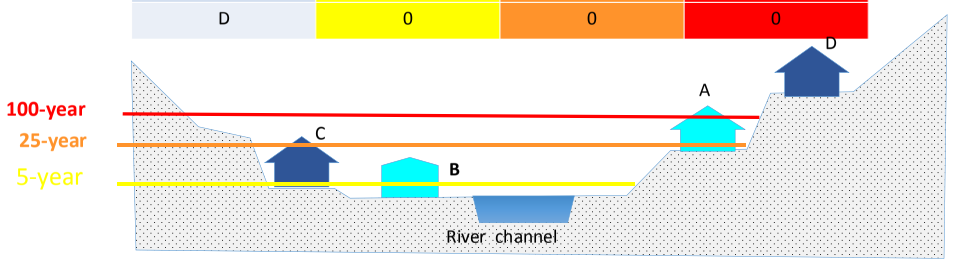
JICA Study

Risk Assessment Illustrated:

Exposure

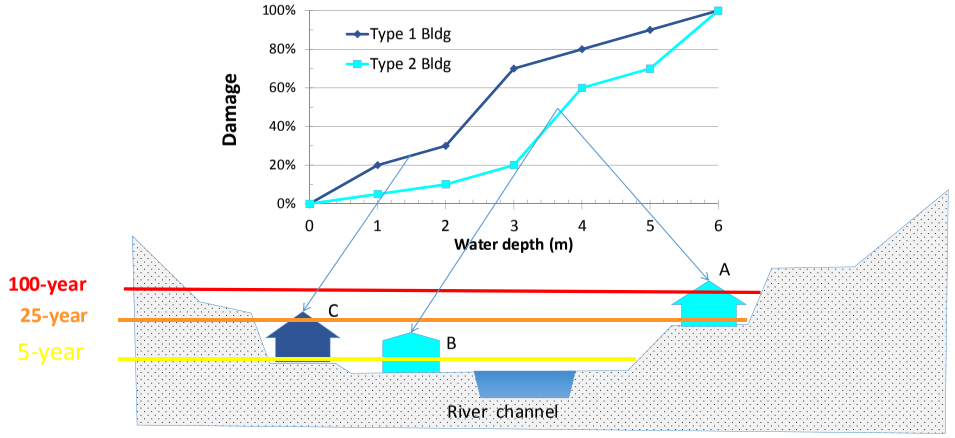
Water depth per return Period

Building	5-year	25-year	100-year
A	0	1.2	3
B	1.5	5.7	7.4
C	0.3	3.6	6.2
D	0	0	0



Risk Assessment Illustrated:

2. Vulnerability



Risk Assessment Illustrated: 3. Consequence

House	Return Period (RP)	Probability	Value (Php)	Vulnerability	Consequence	Risk per RP
A	5	0.2	100,000	0	-	207,000
B	5	0.2	100,000	0.75	75,000	
C	5	0.2	200,000	0.66	132,000	
A	25	0.04	100,000	0.1	10,000	247,000
B	25	0.04	100,000	0.85	85,000	
C	25	0.04	200,000	0.76	152,000	
A	100	0.01	100,000	0.1	10,000	310,000
B	100	0.01	100,000	1	100,000	
C	100	0.01	200,000	1	200,000	

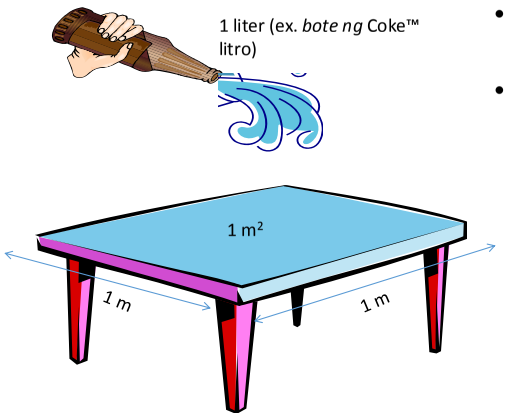
Objectives

1. Undertake the development of the hydrological models for the watersheds contributing runoff to the study area.
   1. The input rainfall scenarios are based on the rainfall-intensity-duration-frequency (RIDF) curves generated by the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA).
2. Set up **flood simulation** models will then generate water depth or inundation results for the various input rainfall scenarios previously mentioned.
3. Produce flood inundation maps depicting the different scenarios.

Objective 3: Create flood inundation maps for various rain return period scenarios

- Ondoy event
- 1.11 year
- 1.25 year
- 1.33 year
- 2
- 3
- 4
- 5
- 10
- 20
- 25
- 50
- 75
- 100
- 150
- 200
- 250
- 475
- 500
- 1000

Understanding rainfall data



- First, we need to understand how rainfall is reported
- 1mm of rainfall means pouring a "litro" size bottle over 1m x 1m square (size of a typical coffee) table.

Understanding a Rainfall "return period"

- Rainfall occurs with certain **intensity**
  - Usually described as **rain rate (i.e millimeters/ per hr) or total amount (e.g. 50 mm in last 24 hours)**
- Rainfall occurring with **a certain intensity** lasts for a **duration**
- Rainfall with **higher intensity** and/or longer duration occurs **less often or frequent.**

Rainfall and the R-I-D-F

- Rainfall intensity-duration-intensity-frequency **(RIDF)** curves summarize events
  - Generated by PAGASA from its historical rainfall records
  - 5-year rainfall return periods may refer to rainfall that occurs **at least** once in 5 years.
- **RIDFs** for rains occuring 24 hours are used in simulating flooding events

"Probability"?

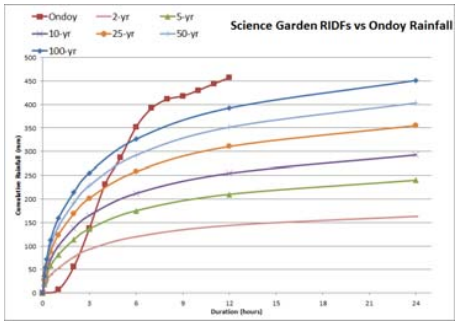
- WRONG!: Every five years!
- WRONG: Once every five years
- CORRECT: "*at least* once **in five years"**
- Or "more than 20% chance of happening every year"
- Are you willing to take this chance?!!

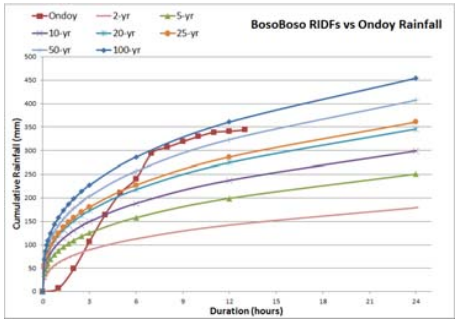
Rainfall-Intensity Duration Frequency (RIDF) of Science Garden Station (from PAGASA)

T (yrs)	10 mins	20 mins	30 mins	1 hr	2 hrs	3 hrs	6 hrs	12 hrs	24 hrs
2	23	33.4	41.2	55.5	76.7	90.3	117.4	136.3	156
5	31.4	45.5	57.6	81.8	113.2	135.7	185.1	216.1	243.1
10	37	53.6	68.5	99.3	137.5	165.8	229.9	268.9	300.7
15	40.1	58.1	74.6	109.1	151.1	182.7	255.2	298.8	333.3
20	42.3	61.3	78.9	116	160.7	194.6	272.9	319.6	356
25	44	63.7	82.2	121.3	168.1	203.8	286.5	335.7	373.6
50	49.2	71.2	92.4	137.6	190.8	231.9	328.5	385.2	427.6
100	54.4	78.7	102.5	153.8	213.3	259.9	370.2	434.4	481.2

Rainfall conditions used: Ondoy Level

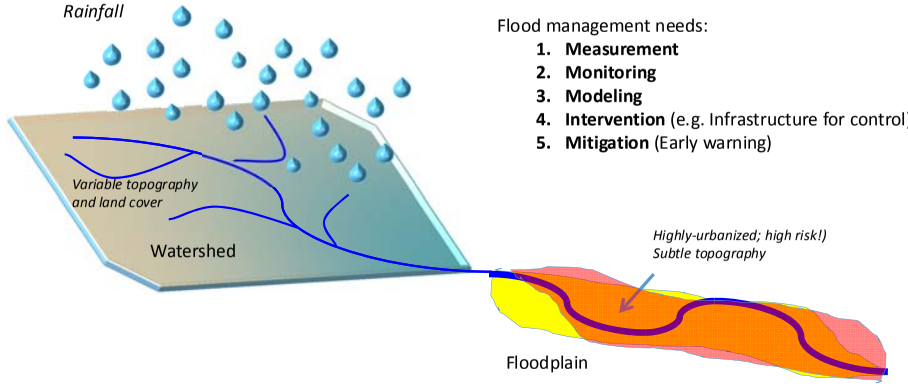
- Science Garden Station
- Boso Boso Rainfall Station





Rain Gauge	Total Precipitation (mm)	Peak rainfall (mm)
Boso-boso	344	57
Science Garden	530.6	229

Spatial Framework for Flood Analysis



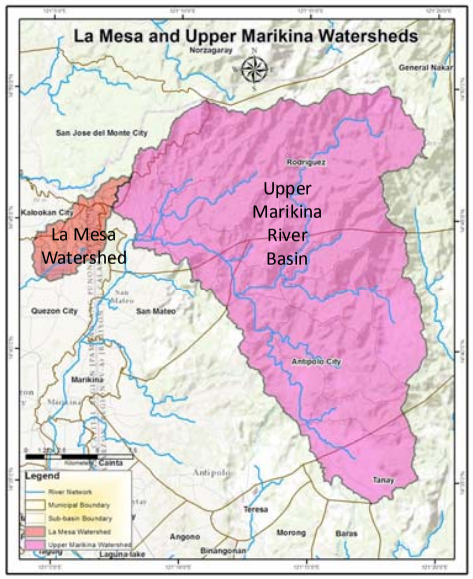
Flood management needs:

1. **Measurement**
2. **Monitoring**
3. **Modeling**
4. **Intervention** (e.g. Infrastructure for control)
5. **Mitigation** (Early warning)

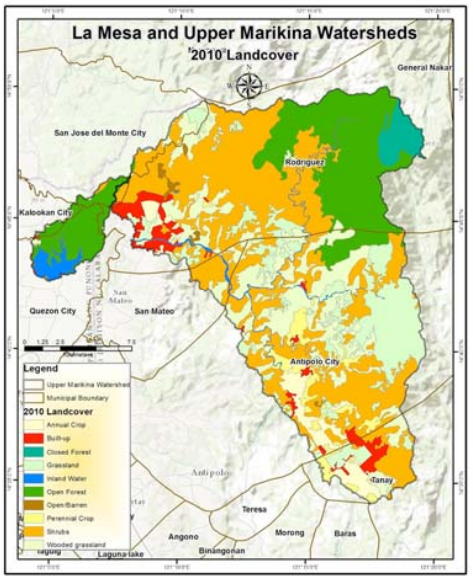
COMMON NEED: Accurate, reliable and up-to-date Spatial DATA and modeling techniques

Watershed boundaries

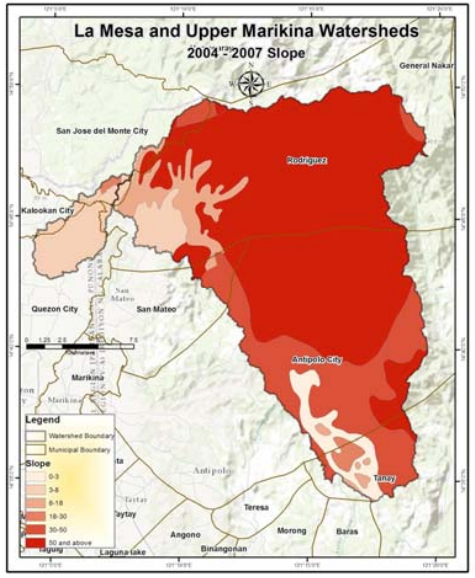
- Upper Marikina River
- La Mesa Watershed
- Flow from these two major river basins were first simulated as an input to the flood routing
  - First done for Ondoy event for calibration
- Then the inflows for the 19 flood modeling scenarios were generated
  - Used as inflow for the scenarios



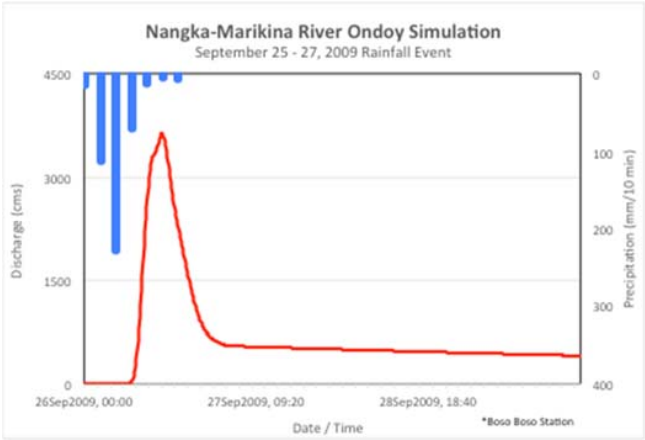
Land Cover Map of Upper Marikina and La Mesa Watersheds



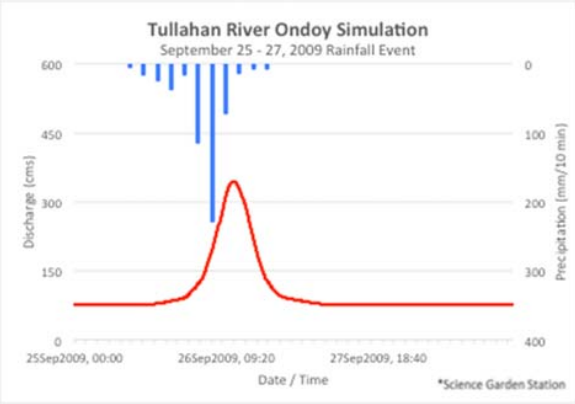
Slope Map of Upper Marikina and La Mesa Watersheds



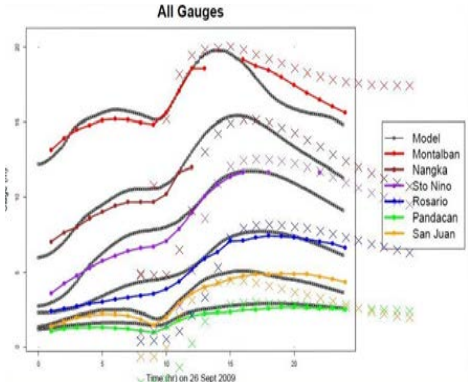
Marikina River Discharge from Ondoy Event



Tullahan River Discharge from Ondoy Event



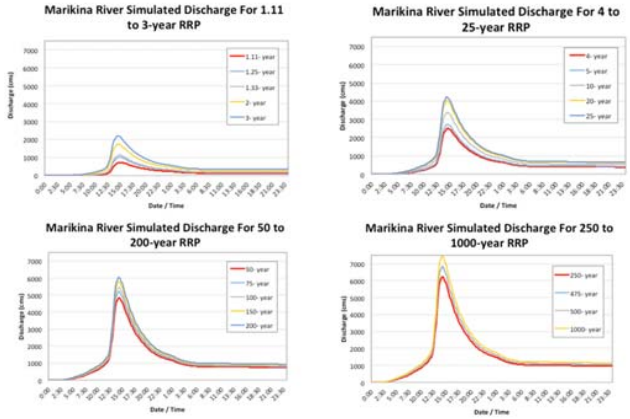
Discharge Model Simulation



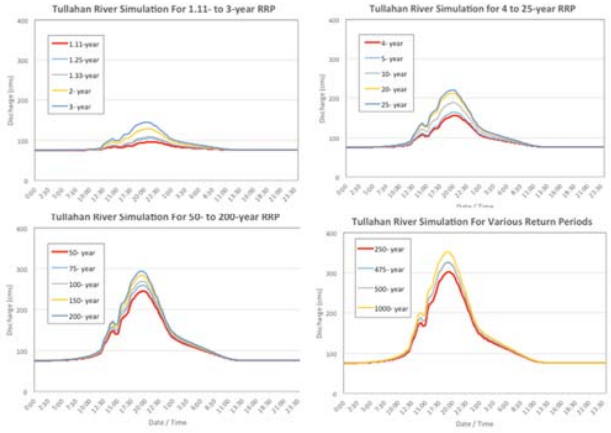
- Left shows water level station (solid lines)
- Dots indicate water level for same points based on model

PAGASA-GA (2014)

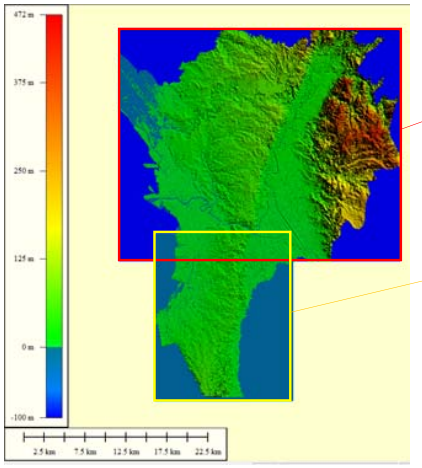
Rainfall-Hydrographs for various scenarios of rainfall return periods: Upper Marikina RB



Rainfall-Hydrographs for various return periods: La Mesa Watershed draining to Tullahan River

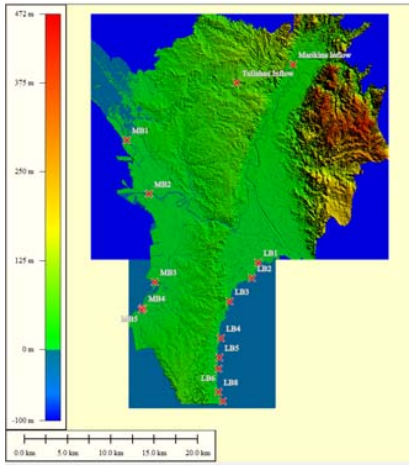


DEM and Model



- Uses the GMMA RAP DEM with hydrocorrections and stream conditioning
- Marikina-Tullahan Model
  - Discharge
    - Marikina (Boso-boso)
    - Tullahan (Mt. Oro)
  - Rainfall
    - Science Garden
- Pasay Model
  - Rainfall
    - Science Garden

Boundary Condition



*MB – Manila Bay

The Highest Astronomical Tide (HAT), 0.91m above mean sea level, is timed to the arrival of the peak inflow and was used as the boundary condition for the following points.

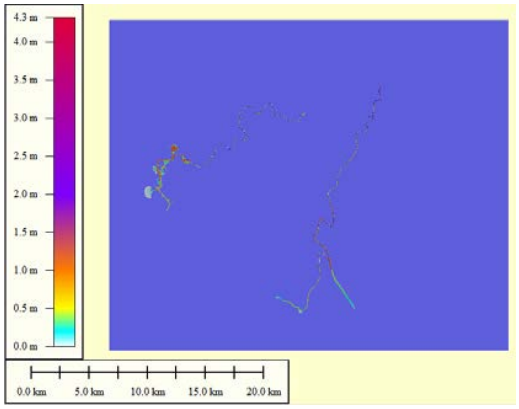
*LB – Laguna de Bay

The maximum lake level computed from the rainfall coming from the entire Laguna de Bay basin (area: 27,00km^2) to the Bay area.

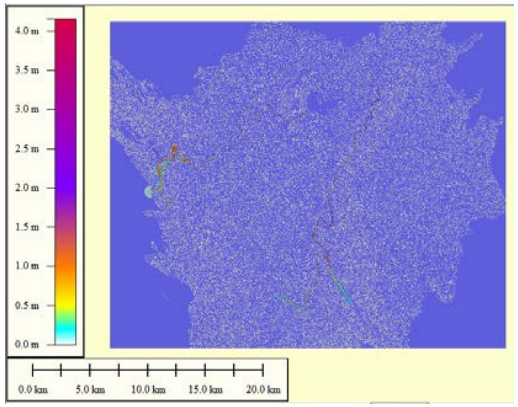
Event	Water Level (m)
Ondoy	3.45
1.11	2.56
1.25	2.62
1.33	2.64
2	2.76
3	2.85
4	2.9
5	2.94
10	3.07
20	3.19

Event	Water Level (m)
25	3.23
50	3.35
75	3.41
100	3.46
150	3.53
200	3.58
250	3.61
475	3.72
500	3.73
1000	3.85

Boundary Condition – Initial Baseflow



Water Depth @ 0 Min

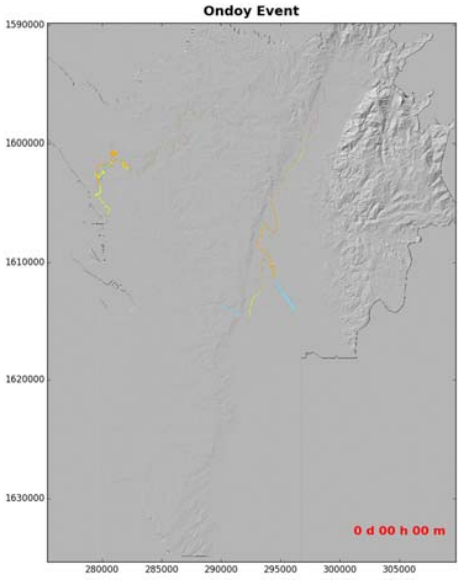


Water Depth @ 10 Min

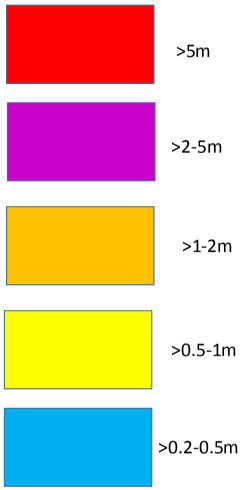
Flood Modelling Results

Ondoy Event Visualization

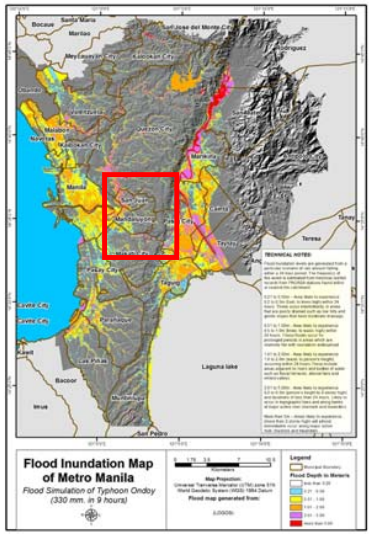
- Right shows continuous simulation of flood inundation during Ondoy event for the two domains
- Simulated event is for 24-hour period from Sep 26 12mn
- The colors indicate the level of flooding (next slide)

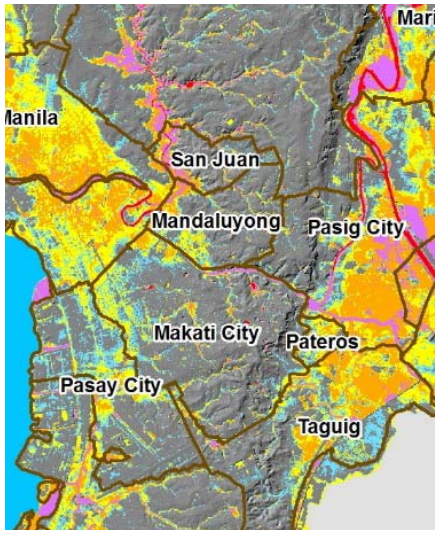


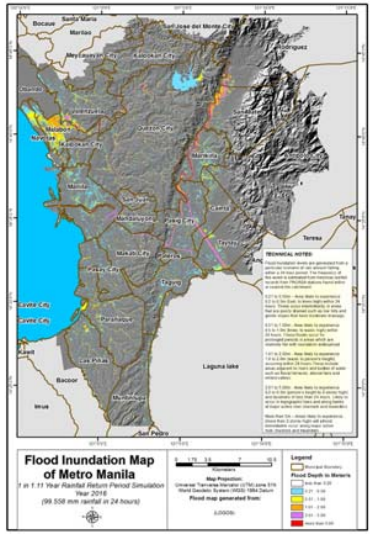
Description of flood levels



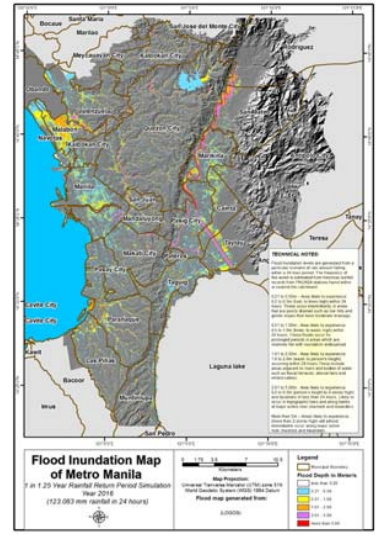
- More than 5m – Areas likely to experience (more than 2-storeys high) will almost immediately occur along major **active river channels**, streams and meanders.
- 2.01 to 5.00m - Area likely to experience >2.01 to 5m (person's height to 2-storey high) and durations of less than 24 hours. Likely to occur in topographic lows and along **banks** of major active river channels and meanders.
- 1.01 to 2.00m - Area likely to experience >1.0 to 2.0m (waist- to person's height) occurring within 24 hours. These include **areas adjacent to rivers** and bodies of water such as fluvial terraces, alluvial fans and infilled valleys.
- 0.51 to 1.00m - Area likely to experience >0.5 to 1.0m (knee- to waist- high) within 24 hours. These floods occur for prolonged periods in areas which are **relatively flat** with inundation widespread.
- 0.21 to 0.50m – Area likely to experience >0.2 to 0.5m (foot- to knee-high) within 24 hours. These occur intermittently in areas that **are poorly drained** such as low hills and gentle slopes that have moderate drainage.



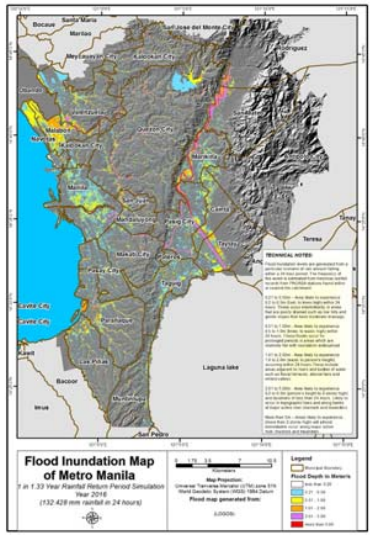




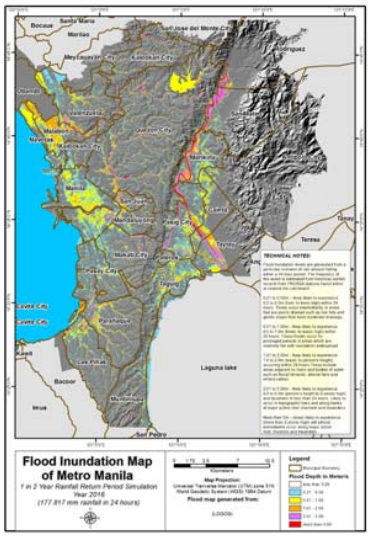
1.11yr RIDF



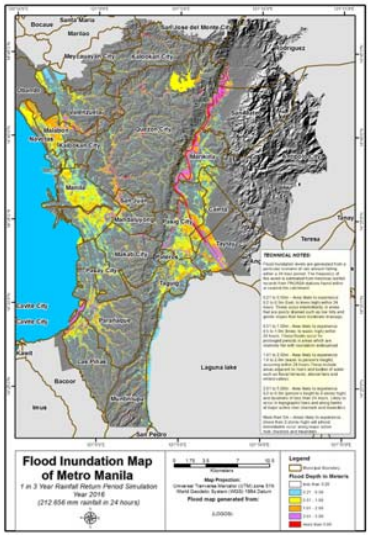
1.25yr RIDF



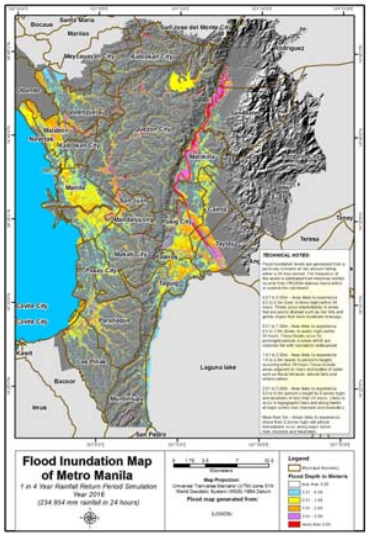
1.33yr RIDF



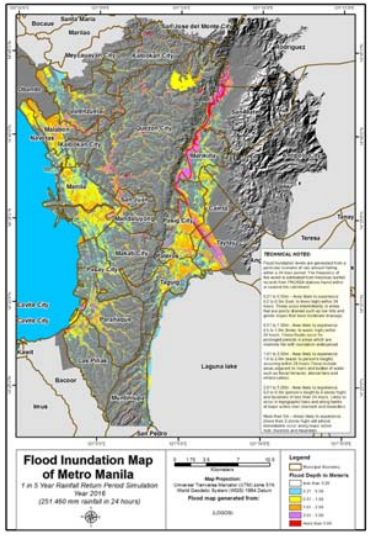
2yr RIDF



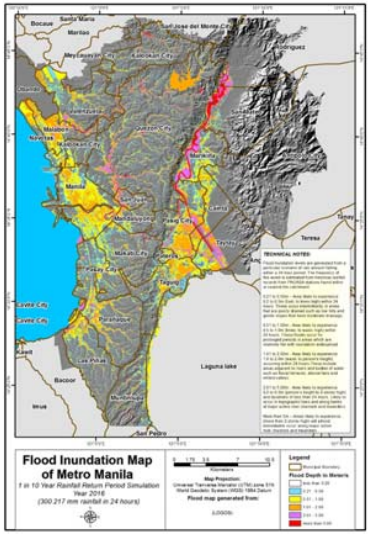
3yr RIDF



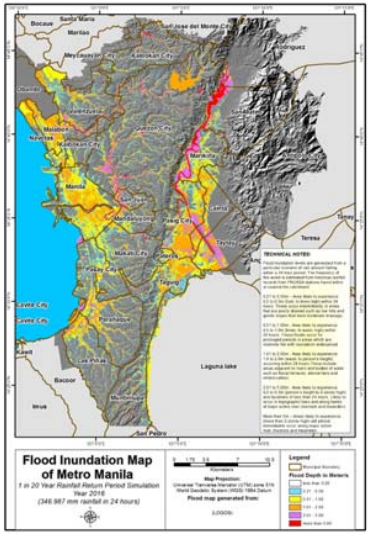
4yr RIDF



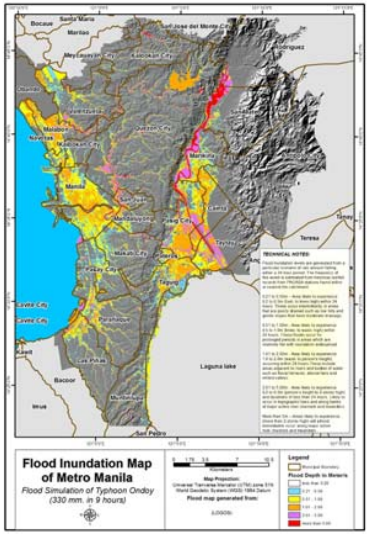
5yr RIDF



10yr RIDF

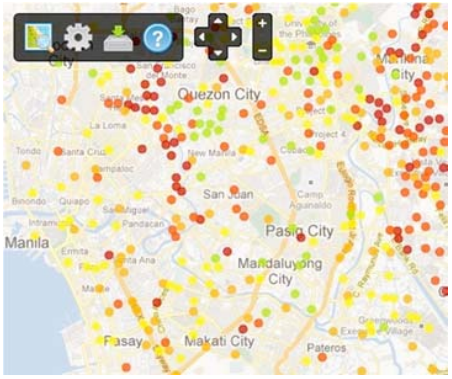


20yr RIDF



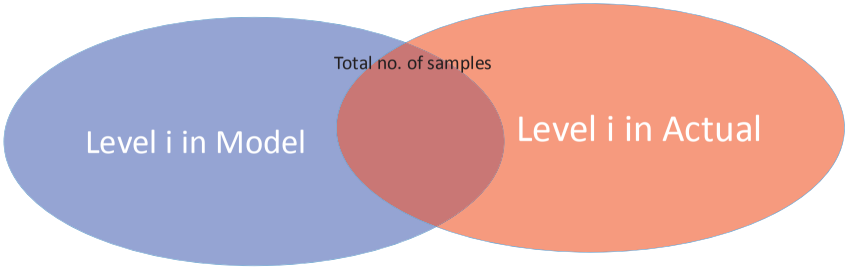
Ondoy Event

Flood map validation



- Made use of data contributed to nababaha.com
  - From crowd-sourced data
- From Ondoy event (Sep 26-27).
- Flood heights are reported as indicative levels instead of heights
  - 0 – No flooding
  - 1 – Ankle deep
  - 2 - Knee deep
  - 3 – Waist deep
  - 4 – neck deep
  - 5 – top of head deep
  - 6 – 1-storey high
  - 7 - 1.5 storey high
  - 8 – 2 storeys or higher

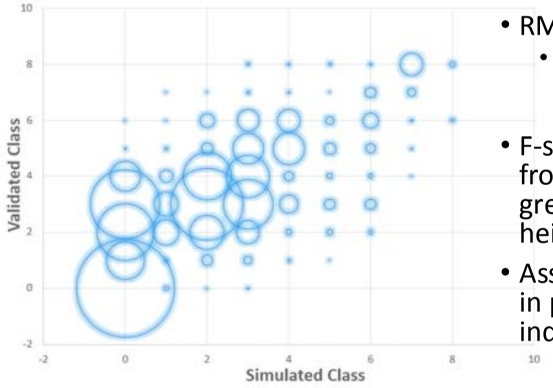
Flood Inundation Validation



- Makes use of F-statistic (Horritt et al)
- X_i – modeled height for sample *i*
- X'_i – actual height sample *i*
- F=100% if perfect fit
- F=0% if no correspondence or no data for that lelve

$$F = \frac{\sum_{i=1}^{n} (X_i \geq H) \square (X'_i > H)}{\sum_{i=1}^{n} (X_i > H) \square (X'_i > H)}$$

Flood height validation: results



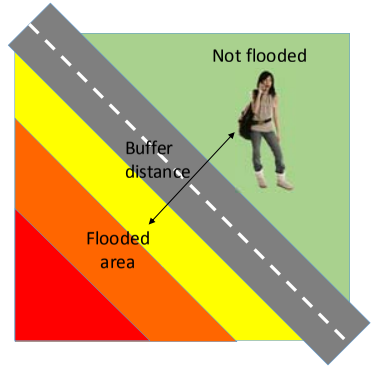
Circle size indicates number of corresponding sample

- RMSE was 0.771m
  - Meaning flood level accurate to 0.771m
- F-statistic varies from 23.5 to 0 at greater flood heights
- Assumes no error in position indicated by user

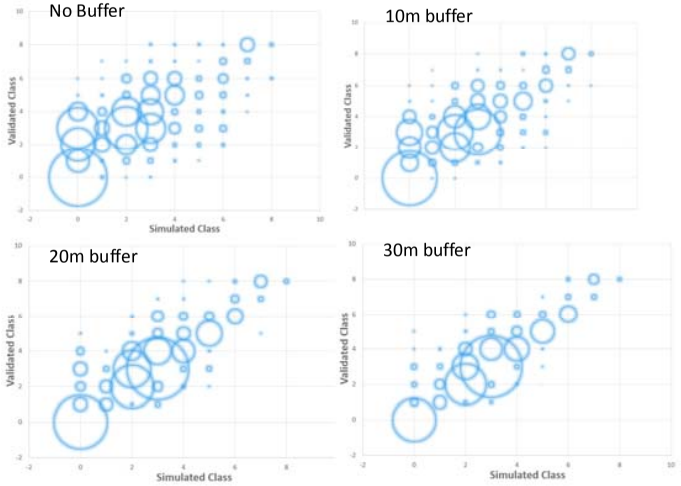
Level	F-statistic (%)
0	23.45
1	32.56
2	22.24
3	14.58
4	6.08
5	0.85
6	0.24
7	0.00
8	0.00

Flood height validation: interpretation

- The position of the points may not reported accurately
- Then we can interpret the flood heights liberally
- We can use a b**uffer distance** to interpret reported flood



Comparison among different buffer distances



Flood accuracy assessment: for all cases

Flood inundation level	Description	F-Statistic			
	Buffer distance from sampled site	0-m	10-m	20-m	30-m
	RMSE	**0.771**	**0.731**	**0.599**	**0.505**
0	No flooding	23.45	35.36	47.63	56.50
1	ankle deep	32.56	30.38	30.13	27.34
2	Knee deep	22.24	18.23	13.37	10.94
3	Waist deep	14.58	11.18	6.32	4.37
4	neck deep	6.08	4.13	2.19	0.61
5	top of head deep	0.85	0.49	0.24	0.24
6	1-storey high	0.24	0.24	0.12	0.00
7	1.5 storey high	0.00	0.00	0.00	0.00
8	2 storeys or higher	0.00	0.00	0.00	0.00

Thank you very much!

Interactive session (11:20 – 12:00)

Possible solutions to address and rectify underinsurance and no-coverage issues

November 16, 2016

GSIS Insurance Scheme for Public Facilities

1) GSIS provides insurance coverage to assets and properties that have government insurable interests.
2) While this is a compulsory insurance scheme, some of the accounts are uninsured or underinsured.
3) Property insurance is one of reliable financing tools for recovery from natural disaster when it is properly designed and implemented for the purpose.

Issue	Concern	Action
No Insurance No Coverage against Natural Disaster	No insurance payment for reconstruction	LGU is allowed to use DRRM fund for premium to have insurance coverage– Being Implemented by the Government (Premium from National Agency comes from MOE of the Agency) Many of schools are not insured or insured fire only
Underinsurance	Amount of insurance payment is reduced due to underinsurance that results in "inadequate for replacement"	1) Insurance valuation of the facility is needed to establish fair Replacement Cost 2) Change in Awareness to the Insurance
	Currently no effective mechanism to avoid extraordinary underinsurance	

A mechanism to address No Insurance Coverage and Underinsurance issues is needed

Insurance of Public Assets – Challenges

No coverage or Inadequacy of insurance

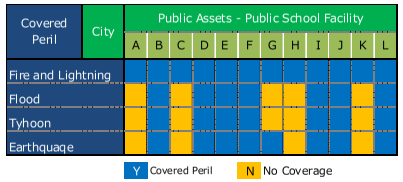
- Despite the requirements by the law, many of the public assets are not insured and no coverage on the natural disaster.
- Many of the public assets are substantially under-insured.

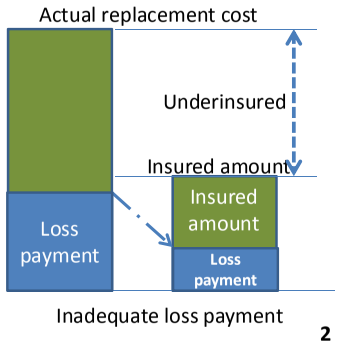
Consequence

- No loss payment if there is no coverage.
- Loss payment is likely to be inadequate if it is underinsured.
- Undermine "Disaster Risk Financing Strategy" as the loss payment is not adequate to cover funding needs for recovery.

Build Back Better

Coverage on natural disasters





Inadequate loss payment

GSIS Insurance Scheme for Public Facilities

Issue 1: No insurance / No coverage on Natural disaster

i. Promote recognition of natural hazard risks specific to the location and integrity of the facility.

Issue 2: Underinsurance

i. Recognition of the policy wording.
ii. Insureds should have a capacity to carry out an insurance valuation.
iii. GSIS should examine if the insurance value is accurate

i. Recognition of the policy wording

MEMORANDA TO SECTION

2. Average

If the Reinstatement Value of Property Insured shall at the time of any loss destruction or damage be collectively of greater value than the Sum Insured thereon, then the Insured shall be considered as being his own Insurer for the difference between the Reinstatement Value and the Sum Insured and shall bear a ratable proportion of the loss accordingly. Every Item if more than one on the Policy shall be separately subject to this Condition

$$\text{Amount Payable} = \left(\frac{\text{Insured Value}}{\text{Replacement Cost}} \times \text{Loss}\right) - \textbf{Deductible}$$

4

ii. Insureds should have a capacity to carry out an insurance valuation

1. Suggestion from JICA Study
   - An insurance valuation by insured is necessary.
   - A guideline for carrying out an insurance valuation should be established between GSIS and the Government agencies.

2. Example: Public Schools
- A guideline may include,
  - ✓ Frequency and timing of conducting an insurance valuation
  - ✓ Methodology of the valuation
- Insurance valuation may use,
  - ✓ Cost Data Base available in the market
  - ✓ DPWH has an estimate for construction of the building for their standard school design.

A-44

iii. GSIS should examine if the insurance value is accurate

1. Suggestion from JICA Study
- GSIS should examine if the Declared Insurance Value is accurate.
- Insurance application form should be improved for this purpose.

2. Example: Public schools – available information

DepEd DB:
National School Buildings Inventory
- Name of School
- School ID
- Building Type
- Size of Class Room
- Number of Class Rooms
- Construction Year
- Stories
- Building Numbers
- Coordinate(Location)

GSIS Insurance DB:
Underwriting Information DB
- ☐ Name of School
- ☐ Sum Insured
- ☐ Covered Perils
- ☐ Premium Rate
- ☐ Premium
- ☐ Term of Policy
- ☐ Coordinate (Location)

7

2 第 2 回合同調整会議

2.1 第 2 回合同調整会議の概要

2016 年 11 月 16 日に実施した第 1 回合同調整会議（JCM）での議論を受け、第 2 回 JCM では、①本調査最終結果の共有、②保険を利用した公共インフラ強靭化メカニズムに関する調査団からの提案内容の協議、③安全でレジリエントな社会実現に向けた今後の取組みに向けた議論、を目的に行われた。前回同様、公共インフラ施設に対する災害損害保険に係る関係省庁、ドナー等を招き、2017 年 3 月 15 日に GSIS で開催したものである。

表 2-1 第 2 回 JCM の概要

表題	Joint Coordinating Meeting on JICA Study on Insurance Mechanism for incentivizing Disaster Resilient Public Infrastructures in Metro Manila
日時	2017 年 3 月 15 日（水）9:00～14:00
場所	Multi-Function Room, GSIS, Manila
参加人数	53 名　（GSIS, 関係省庁、世界銀行、プロジェクト関係者等）

2.2 プログラム

JCM のプログラムを下記に示す。

第 2 回 JCM プログラム

Topic	Expositor	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		
Session1.	Mr. Takeshi Kuwabara, Leader of JICA Study Team	9:10 – 9:40
Session2. 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,	10:40-11:00

	Kyoto University	
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

2.3 発表の概要

調査団からは桑原総括より本調査の最終結果の共有及び調査団からの提案事項の説明を、西嶋団員より風水災リスク削減に関する事例紹介及び提案を行った。詳細は下図に示す。その後調査団からの提案内容に対し、関係省庁からの出席者を中心に議論を行った。会議で使用した発表資料は添付資料 3 を参照のこと。

Session1. Outcome of the JICA Study **Mr. Takeshi Kuwabara, Leader of JICA Study Team** 桑原総括より、GSIS の災害保険に関する概要と現状での一部保険、未保険等の問題点を説明した。
Session 2: Risk-based insurance premium pricing **Mr. Takeshi Kuwabara, Leader of JICA Study Team** 桑原総括より、本調査で開発したリスクベース保険料算出ツールの概要説明及びリスクベース保険料率を用いた防災投資に関する提案を行った。
Session 3: Program to enhance DRR investment **Mr. Takeshi Kuwabara, Leader of JICA Study Team** 桑原総括より、防災投資を促進するための 3 つの提案（①リスクベース保険料の導入、②公立学校防災認定プログラム、③防災改修ファンド）について説明を行った。
Wind and flood risk reduction: Damages, countermeasures and efficiency **Dr. Kazuyoshi Nishijima, JICA Study Team, Disaster Prevention Research Institute, Kyoto University** 西嶋団員（京都大学防災研究所）より、強風・水災害のリスク削減の手法をフィリピンの事例をもとに紹介した。

Session 4: Recommendations

桑原総括よりこれまでの３つのセッションで説明した調査団の提案、①無保険や災害保険未加入問題解決のための方策、②リスクベース保険料率の導入、③防災投資促進のための３つの方策について、再度説明を行った。討議では、勘定評価、再調達価格等の定義の確認や、公共インフラ保険に対する GSIS の役割、調査団から提案した「防災改修ファンド」や「公立学校防災認定」について言及された（詳細は本報告書 2.5 及び添付資料 1　JCM2 議事録を参照）。

2.4　質疑応答概要

本会議で行われたプレゼンテーションに対する質疑応答の概要は下記の通りである。

質問 1.（JICA/OCD）セッション２のプレゼン資料 12 ページと 13 ページの MRT の地盤について、一部情報が異なっている。
【回答】（調査団）内容を確認する。
質問 2.（PHIVOLCS）一度の地震の衝撃で、しばらく経ってから（例えば一ヵ月後）損害が発生した場合、保険はどのように支払われるか？また液状化は補償の範囲内か？
【回答】（GSIS）最初の地震から時間が経って発生した損害は別のイベントと考える。もし保険契約金額を使い切っていなければ両方のイベントが補償される。支払額は最初に行われる査定に基づく。地震保険の契約がある場合、それによって引き起こされた液状化による地盤沈下も補償範囲となる。
質問 3.（JICA/OCD）資料 5 の地震の負荷について、建築材や設計で負荷を減らすことは可能か？また、21 ページにある屋根の開口部について、フィリピンの建物内は高温多湿になるので、環境に適した制御方法を考える必要があるのでは？
【回答】（調査団）建築材で負荷を減らすことは可能。日本の木造建築は比較的軽い。ただ建築材の選択肢としては鉄筋コンクリート、鉄骨、木造の 3 種類しかない。 開口部は台風が来た際には閉じられる必要があるので、屋根ではなく壁の上部に小さな窓か開口部を設けるとよい。21 ページに示した屋根の開口部は、現地では通気のためと言っているが、実際は施工技術の低さが原因とも考えられる。
質問 4.（JICA/OCD）資料 5（強風・水災害のリスク削減）の 5 ページにある地震の負荷について、建築材や設計で負荷を減らすことは可能か？また、21 ページにある屋根の開口部について、フィリピンの建物内は高温多湿になるので、環境に適した制御方法を考える必要があるのでは？
【回答】（調査団）可能。日本の木造建築は比較的軽い。ただ建築材の選択肢としては鉄筋コンクリート、鉄骨、木造の 3 種類しかない。開口部は台風が来た際には閉じられる必要があるので、屋根ではなく壁の上部に小さな窓か開口部を設けるとよい。21 ページに示した屋根の開口部は、現地では通気のためと言っているが、実際は施工技術の低さが原因とも考えられる。

質問 5. （PHIVOLCS）日本では基礎免震機器が地震負荷を減らしていると聞いている。フィリピン政府も基礎設計の際に免震機器を推奨すべき。

【回答】（調査団）基礎免震も 1 つの選択肢だろう。

2.5 調査団提言に対する主な討議内容

Session 4: Recommendations

桑原総括よりこれまでの３つのセッションで説明した調査団の提案、①無保険や災害保険未加入問題解決のための方策、②リスクベース保険料率の導入、③防災投資促進のための３つの方策について、再度説明を行った。主な討議内容は下記の通り（詳細は添付資料 1 会議議事録参照。またその他のコメントは添付資料 2　参加者コメントシートを参照）。

政府資産の勘定評価

- 公共インフラの鑑定評価は誰が行うのか？（DOTr）
  =>勘定評価を行うのは資産のオーナーである各省庁の役割であり、BSP（フィリピン中央銀行）などは第三者による勘定評価を行っている。3 年に一度の勘定評価を推奨している（GSIS）。
- 資産の評価には資産そのものの経済的価値だけでなく、経済的影響も含むべき（Dotr）
- 省庁間で資産評価に関するユニットもしくは委員会を作ってはどうか？また各省で共通の資産評価ツールを開発してはどうか？これは各省が持つ内部評価ツールを第三者に認証してもらうのでもよい（DOTr）

再調達価額と減価償却後価額

- RA656 のもと、多くの国の資産にはすでに保険がかかっているが、それらは再調達価額ではなく減価償却後価額をもとにしているはずだ。というのも保険料だけでは再調達費用をまかなえないのでは（DPWH）？=>保険付保の際は通常減価償却後価額ではなく再調達価額を用いるべきである（GSIS）
- 以前道路や橋に対して GSIS 保険付保を考えたが、保険料が高すぎてかけられなかった（DPWH）=>現在のところ、道路や橋に対して保険は付保していない。DepED 管轄の学校も、ニーズはあるが予算の制約があり保険が付保できていないのが現状（GSIS）。

GSIS 及び被保険者の責任

- 資産評価は被保険者の責任であることは理解したが、GSIS の役割は（DOTr）？=>GSIS は被保険者が提示した再調達価額を保険契約の限度額とする。3 年に一度の勘定評価を推奨する（GSIS）
- 資産評価のタイムフレームを標準化すべきだ（DOTr）
  =>現在 RA656 の改正作業中である。改正にあたって、資産評価の担当省庁（DPWH が妥当

か？）やタイムフレームを明言化する等、ガイドラインに含めることが可能（GSIS）。

- DPWH には資産評価の仕組みがあるが、対象は DPWH の資産のみである。この情報は GSIS に共有できる（DPWH）
- 資産評価に関して議論する省庁間の委員会があるとよい（DOTr）

防災改修ファンド

- ここで提案されている防災改修ファンドと、復旧ファンドとの違いは（DPWH）？

=> 防災改修ファンドは、災害が起こる前の建物の耐震化などのための資金で、復旧ファンドは被災後の損害に対するファンドである（JICA 調査団）

- 防災改修ファンドはすでにある「国家災害リスク削減・軽減基金（NDRRM Fund）」に組み入れることが可能ではないか？このファンドは NDRRM Fund が意図している「災害リスク削減」や「復旧」に合致している（DBM）。

=> NDRRM Fund に組み込むためのプロセス及びタイムフレームは？（JICA 調査団）

=>まずはこのファンドの需要があるか、妥当性等について調査され、調査結果をもとに議会と DBM が合意すれば予算が見積られる。2018 年度予算は DBM の場合、2017 年 3 月末までに要求する必要がある。

「再調達（Replacement）」の定義

- 保険付保のための資産評価には「再調達価格」が用いられるとのことだが、フィリピン政府は災害復興の際「Build Back Better」を掲げており、再調達価格を超えるのではないか？「再調達」の定義を明確にしたほうがよい（UP）

=>保険契約内容によって変わる。現金資産価値、再取得価額、機能値などがある。（JICA 調査団）

=>GSIS は再取得価額を推奨する（GSIS）

=>保険付保のための資産評価は現在の現金資産価値に基き、減価償却は考慮しない。（JICA 調査団）

=>法律の中で用いられるのであれば、再調達価額の定義や算出方法を関係者全員が理解する必要がある（DOTr）

=>RA656 改訂プロセスで定義を明言することにする（GSIS）

公立学校防災認定プログラム

- 非常に良いアイデア。観光業が盛んなフィリピンの場合、ホテルにも応用できるのでは（JICA/OCD）
- 詳細については DepED とも討議する（GSIS）

2.6 会議の様子

会議の様子（写真）

<table>
<tr><td> 
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<tr><td>会場内のバナー</td><td>会場内の様子</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>JICAフィリピン事務所大島次長の挨拶</td><td>GSISパランカ上級副総裁の挨拶</td></tr>
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<tr><td>桑原総括の発表</td><td>西嶋団員の発表</td></tr>
</table>

	
Q&Aの様子（１）	Q&Aの様子（２）
	
Q&Aの様子（３）	Q&Aの様子（４）
	
Q&Aの様子（５）	参加者集合写真

添付資料１　会議議事録

Meeting Minutes

Title	2nd Joint Coordination Meeting (JCM)
Date/Time	15th February, 2017 at 9:30am to 14:00 am
Participants	(GSIS) • Atty. Maria Obdulia Vitug-Palanca, Senior Vice President • Mr. Leopoldo A. Casio Jr., Vice President (JICA) • Ms. Ayumu Ohshima, Senior Representative • Mr. Yuji Sano, Country Officer, Southeast Asia Division , Southeast Asia and Pacific Department • Ms. Yoko Yoshida, Representative • Mr. Osamu Itagaki, Expert on DRRM (JICA Study Team) • Mr. Takeshi Kuwabara, Team Leader, Insurance and Disaster Risk Finance, Sompo Risk Management & Health Care Inc. • Dr. Hiroyuki Fujii, Sub-leader, Insurance and Disaster Risk Finance, Sompo Risk Management & Health Care Inc. • Dr. Kazuyoshi Nishijima, Disaster Risk Analysis (Wind and Flood Damage), Kyoto University • Ms. Shio Kuwabara, Seminar Planning, Kokusai Kogyo Co., Ltd. (Other Agencies) See attached attendant list of JCM.
Venue	Multi-Function Room, GSIS
Agenda	1. Opening remarks 2. Outcome of the JICA study 3. Recommendations and discussion for next steps 4. Discussion 5. Wrap up of the meeting and closing
Meeting Materials Attached	1. Agenda 2. Session 1: Resolve uninsured - underinsurance issues 3. Session 2: Risk-based insurance premium pricing 4. Session 3: Program to enhance DRR investment 5. Wind and flood risk reduction: Damages, countermeasures and efficiency 6. Session 4: Recommendations
Main Points Discussed:	
1. Introduction Dr.Kazuyoshi Nishijima opened the meeting and introduced participants from each agency. **2. Opening Remarks**	

Atty. Maria Obdulia Vitug-Palanca provided her opening remarks by welcoming the meeting participants. She briefed on the outcome of last JCM in November, 2016 especially on underinsurance issue of certain government assets. She has explained on the legal basis of GSIS's mandate and also mentioned the latest news on insurance for government facilities including 1 Billion Pesos fund for natural catastrophe insurance.

Senior Representative Ohshima made a remark on importance of investment for disaster management to address economic losses which has stated in the Sendai Framework for DRR. She also mentioned the importance of establishment of effective insurance mechanism for government assets which this JICA study has covered. She also appreciated active participation of each agency to the last JCM .She closed her remark by mentioning that she hopes that the result of the study will contribute to safer and more resilient future for the next generation.

3. Outcome of the Study

1) Session 1: Resolve uninsured - underinsurance issues

- Mr. Takeshi Kuwabara, team leader made a presentation of uninsured - underinsurance issues by using the meeting material 2.

2) Session 2: Risk-based insurance premium pricing

- Mr. Takeshi Kuwabara, team leader made a presentation of Risk-based insurance premium pricing by using the meeting material 3.

[Comments, Questions and Answers]

JICA/OCD (Itagaki): a) As to uninsured and underinsurance issues in the Philippines, is this the first study to confirm the actual situation of the issues?

⇨ **JICA (Kuwabara):** There should be similar studies partly covering those issues but I am not sure if this study is the first one or not.

b) Suggestion on existing hazard maps for risk-based premium setting: the study team should select smaller scale disaster such as 5 year return period flood otherwise most of area in hazard map would be recognized as "High risk area". It's not feasible to promote counter measures including relocation of all buildings in vulnerable area. If the target area is smaller, easier to get public agreement for this kind of policy.

c) Soil conditions for MRT stations. The soil conditions map in P.12 of material 3 shows that only Taft Avenue station is locating in weak area, but the chart in P.13 says Magallanes, Ayala, and Buendia are also in soft soil condition. Please verify the data.

⇨ **JICA (Kuwabara):** We will check the date and verify later.

⇨ **JICA HQ (Sano):** Uninsured issue: all of us aware of this issue because some government issues didn't buy insurance. As for underinsurance issue, some agencies have been aware but did not know the actual amount, that's why we have conducted this study. As a result, this study found out the actual replacement cost of public assets such as MRT3 and NAIAT3 and showed the cost is relatively lower than current sum insured. In thus sense, this could be the first study to address the underinsurance issues from engineering perspective.

⇨ **JICA (Nishijima)**: As to the second question on how to choose the area for disaster risk reduction, we will discuss in session 3 later.

[10 minutes Break]

3) Session 3: Program to enhance DRR investment

- Mr. Takeshi Kuwabara, team leader made a presentation of Program to enhance DRR investment by using the meeting material 4.

[Comments, Questions and Answers]

JICA/OCD (Itagaki): a) Concept of DRR renovation fund is good enough, however, please consider location

risk as well as building risk. For example, the buildings in highly inundated area should not be strengthening because the renovation of those buildings will not reduce the risk of inundation. b) DRR Renovation Fund can be part of DRRM Fund in the Philippines. Since OCD is secretary of DRRMC, OCD could be included in this recommendation in P.21 of material 4.

⇨ **JICA (Nishijima):** We will consider the comments. Flood protection issue will be discussed after my presentation.

PHIVOLCS (Ismael Narag): a) Serious damage after very strong shock (for example a month after) will be included in the coverage? How do you computation the building damage? The increased damage will be also covered? b) Mr. Kuwabara said some lands will also be damaged. Will this such as liquefaction phenomenon be covered by insurance?

⇨ **GSIS (Casio):** For example, the event happened 10 days after is another event. If the sum insured of the policy is not exhausted, both events will be covered. Computation is based on the initial investigation.

⇨ **GSIS (Casio):** Insurance will cover only buildings but approximate cost of the loss is peril. Peril is subsidence of liquefaction caused by very strong earthquake, and then the policy will be triggered if the policy has an earthquake cover.

4) Wind and flood risk reduction: Damages, countermeasures and efficiency

- Dr. Kazuyoshi Nishijima, team member, Kyoto University made a presentation of disaster risk analysis of wind and flood damage by using the meeting material 5.

[Comments, Questions and Answers]

JICA/OCD (Itagaki): a) P.5: Regarding earthquake loading, can choice of materials or design reduce the damage?

⇨ **JICA (Nishijima):** That's possible. Japanese housings are using wooden. Those are relatively light. We can also use light materials for roofing. But when it comes to construction materials, there are only 3 choices, concrete RC, steel or wooden.

⇨ **JICA/OCD (Itagaki)**: I suggest you to include design or other more ways to reduce the earthquake loading.

b) I agree with your idea that no controlled openings are dangerous shown in P.21. But I want you to suggest appropriate way to control openings in high temperature and humid weather in the Philippines.

⇨ **JICA (Nishijima):** In case of Typhoon, those openings must be able to close. I suggest small windows or openings on the top of the wall. Those can close when Typhoon is coming. I suspect those openings are not only for ventilation. It is because of insufficient construction skill.

PHIVOLCS (Mr. Ismael Narag): I think buildings in Japan base isolation devices reduce the earthquake loading. Ask government to add the recommendation on devices for designing foundation.

⇨ **JICA (Nishijima):** That's would be the one of the options.

[30 min Lunch Break]

4. Recommendations and discussion for next steps

1) Session 4: Recommendations

- Mr. Takeshi Kuwabara, team leader made a presentation of recommendations and discussion for next steps by using the meeting material 6.

[Comments, Questions and Answers]

<Valuation / Appraisal of Government Assets>

DOTr (Name): Regarding 1B Php budget, <u>who will evaluate the value of asset</u>? Us or GSIS? GSIS will provide Technical Assistance? Problem is replacement cost for ICC approval is not reflected the valuation of assets.

⇨ **GSIS (Casio):** Probably assistance is always there but for most of the GOCC, they <u>hire the third party appraisal company</u>. In the case of BSP (Bangko Sentral ng Pilipinas) (central bank of the Philippines) they

appraises the assets once in every 1-3 years and they pay for the appraisal cost. Most of the appraisal cost will be paid by agencies. Since the value of these government assets will be hundreds of billions, we recommend appraisal once in every 3 years. In case of major catastrophe, GSIS will pay out for the agencies based on the replacement cost at the time of loss. Unfortunately value of NAIAT3 is 7 billion but current value is 32 Billion. If major catastrophe creates 70-80% loss of the terminal, payout will be only 50% because of underinsurance. That's why we have to educate agencies insuring appropriate value of the assets.

⇨ **DOTr (Name):** In case of catastrophe country will suffer. Evaluation should not be on the asset itself but rather on the economic impact.

⇨ **JICA (Nishijima):** Valuation for the purpose of appropriate premium pricing should be based on the value of assets but evaluation for prioritizing retrofitting or upgrading should be taken into account on economic impact.

DOTr (Dir. Felicisimo Pangilinan): Regarding evaluation of assets. OTS (Office for Transportation and Security) is leading risk assessment of properties and facilities in terms of security. To provide good assessment for the facility, I recommend establishing particular unit or committee which will be involved in the assessment inside the government and maybe develop the tool for internal evaluation process to take this initiative.

⇨ **JICA (Nishijima):** The tool you are suggesting is to develop is the sector-wide or more standard way to evaluate the value not just by individual unit but more generic tools?

DOTr (Dir. Felicisimo Pangilinan): It could be an internal tool for department and this could be validated by the third party. Every agency has now tool to evaluate their assets and they need to do it.

<Replacement Value and Depreciated Value>

DPWH (Maria Visna Manio): 1 Billion funds come out as a result of the Sendai Framework 2015 where one of the priorities is financing the risk. But at present, not yet prioritize which assets to be insured. Under RA656, most of national buildings are already insured but that insurance is not based on the replacement value. Insurance is depreciated appraised value. Insurance could not cover the replacement cost. How it would be concluded?

⇨ **GSIS (Casio):** We are reviewing the RA656. We will recommend to the committee to put provision as to evaluation of the declaration of the sum insured to the GSIS to the property insurance fund. For purpose of insurance, it should be replacement value instead of depreciated value.

⇨ **DPWH (Ms. Maria Visna Manio):** How about roads and bridges? Initial presentation of premium by the GSIS was so high.

⇨ **GSIS (Casio):** Roads and bridges are not insured currently. Most of the Deped public schools are vulnerable but not insured either due to budgetary constraints. That's one of our dilemmas.

<Responsibility of GSIS and insured>

⇨ **JICAHQ (Sano):** To solve the uninsured and underinsurance issues, two things should be considered, 1) how we can adjust insurance policy to increase the sum insured to the actual replacement cost, and 2) how to evaluate assets technically. As to the first point, JICA study team recommended that valuation of replacement cost is under responsibility of insured not insurer. Insured evaluate their assets and submit replacement cost to insurer, GSIS. GSIS will confirm replacement cost submitted by the insured. Then, JICA study team recommended including those responsibilities of insured into the policy.

As to the second point, JICA study team recommended that government infrastructures with complicated structure such as MRT and NAIA T3, would be better to use the third party appraisal because of those structural complexity. For public schools or other public assets, recommend to establish simple desk top evaluation system explained during session 1. For this system, only unit cost will be used for the evaluation.

- ⇨ **DOTr (Name):** I understand the responsibility of valuation is on insured. GSIS will not evaluate anymore?
- ⇨ **GSIS (Casio):** We consider the replacement cost declared by insured as a maximum limit of the policy. If the amount exceeds the government attention, it subjects to procurement thorough local or international reinsurance market. Our recommendation to insured is that conducting appraisal once in every 3 years.
- ⇨ **DOTr (Name):** Time frame of evaluation should be standardized.
- ⇨ **GSIS (Palanca):** DPWH mandates to appraise of government infrastructures. We will take note that point for reviewing the guideline of insurance. We are amending RA 656. There is a section talks about appraisal value. COA circular also does. We can put appraisal including time frame (once in every 3 or 5 years) as one of the mandates of DPWH.
- ⇨ **DPWH (Maria Visna Manio):** DPWH has own appraisal but for the DPWH's property only. It will be submitted to GSIS. We do have appraisal unit.
- ⇨ **DOTr (Name):** We need to have an inter-agency committee to discuss those topics.
- ⇨ **GSIS (Palanca):** Yes.

<Renovation Fund>

DPWH (Maria Visna Manio): Regarding DRR investment in Session 3, what is the difference between Renovation fund and the Rehabilitation and Recovery fund?

- ⇨ **JICA (Kuwabara):** Renovation fund is for retrofitting before the damage and recovery fund is for after the damage. I know there is a fund for LDRR which allocate certain amount of fund for the damages by natural disasters in last 2 years. But this fund is for existing buildings for retrofitting before something will happen.
- ⇨ **DOTr (Name):** Is this concern rebuilt from the damages only by natural calamities or include human induced event? How do you consider power surge/ outage? Because in newly constructed airports in Iloilo and Bacolod, critical equipment were damaged because of surge / outage.
- ⇨ **GSIS (Palanca):** Since JICA study team is talking about traditional insurance (indemnity insurance), damages caused by event like power surge could be covered. Similar to industrial all risks.
- ⇨ **JICA/OCD (Itagaki):** Artificial disasters were not included in the presentation by the study team. In case artificial disaster will be included, we have to consider the probability of those disasters as well for premium calculation.
- ⇨ **GSIS (Palanca):** For the artificial disaster, we look at the market for that.

DBM (Atty. Paula Domingo): DRR renovation fund could be under the existing DRRM fund because it intends disaster mitigation not just rehabilitation. Right now priority of the fund is on the rehabilitation but it could be insurance for the disaster preparedness. It could be included in the disaster mitigation. No need to create a new fund.

JICAHQ (Sano): Current recommendation by the JICA study team is to create a separate fund. This is a loan for property owners. They will repay to the fund by accumulating reduction of the premium. It will become repayment resource. I would like to ask you the feasibility of the fund and possibility to incorporate into the existing fund.

- ⇨ **DBM (Atty. Paula Domingo):** As to loan portion, there is no need to loan to agencies from the government. The government itself should provide the fund for DMC.
- ⇨ **JICAHQ (Sano):** In order to incorporate Renovation fund into DRRM Fund, what kinds of process are required?
- ⇨ **DBM (Atty. Paula Domingo):** In case of 1B insurance fund, it was really needed and study will come later. In case there is a need for renovation, I think it can be included. But implementation for the fund will come after how to properly use the fund. If DBM and the congress satisfy that, they estimate amount based on the initial study.

⇨ **JICA (Kuwabara):** Is there any time frame?

DBM (Atty. Paula Domingo): In case of inclusion in the budget for 2018, now is the season for calling budget until March 31, 2017 for DBM. For the congress that will deliver until September or October later.

<Definition of Replacement>

UP (Enrico Paringit): I would like to clarify the definition of replacement. If Build Back Better, it will cost more than replacement. It will be driver force of the premium.

⇨ **JICA (Kuwabara):** It depends on what types of values you use for insurance contract. Sometimes it is Cash value, replacement cost value, and functional value.

⇨ **GSIS (Palanca):** We recommend replacement value.

⇨ **JICA (Kuwabara):** After the damage, building will be built by the latest building code. It becomes automatically BBB. For example the damaged building is 10 years old and then rebuild by the current building code. It sometimes becomes BBB.

⇨ **GSIS (Palanca):** In case value of the GSIS building is 8 billion, insured value is 8 billion? How much should we insure it for the building? How we know the exact value?

⇨ **JICA (Kuwabara):** There are some clauses in the policy and you can rebuild the GSIS building to original without additional cost. If the value is 8 billion, insurance is 8 billion. That is the concept.

⇨ **DOTr (Name):** How can we think about depreciation in this concept?

⇨ **JICA (Nishijima):** Valuation should be according to the current price and it will use for premium pricing. Depreciation will not be considered in the valuation process. There are 2 options for buying insurance. 1 is to buy insurance to have the original infrastructures and another one is replacement. Infrastructures will be rebuilt by conforming to the current design.

DOTr (Name): What is the objective of the insurance? To provide services to the people, we need to have the same level of infrastructures.

⇨ **JICA (Nishijima):** That's why JICA study team suggested using replacement value for the insurance.

⇨ **JICA/OCD (Itagaki):** In general insurance is up to the owner's decision. Some properties should be insured by law for their function but some might not. Estimation will be done by the owner. So if the estimation of value of asses is lower, premium payment is smaller. When the assets are damaged, receiving amount will be smaller. It's up to owner's decision.

⇨ **JICA (Kuwabara):** Insurance should be based on the replacement value. If the value is lower, the payment will be smaller and not adequate for the replacement. I want all agencies to understand this concept.

⇨ **JICA/OCD (Itagaki):** In that case, national government should shoulder the amount of the gap. We should consider how to reduce the government's portion. We have to raise the portion of insurance.

⇨ **JICA (Kuwabara):** We recommend underinsurance penalty.

⇨ **DOTr (Name):** We have to define and to know how to calculate the replacement cost because those will be used in the law. We all have to have same understanding on those words.

⇨ **JICA/OCD (Itagaki):** If the technical standard upgrade, the replacement cost should increase.

⇨ **GSIS (Palanca):** We will define the word "replacement cost" in the process of reviewing the RA then we will be in the same page.

⇨ **JICA/OCD (Itagaki):** Support from the Government is essential to introduce this kind of system like DRR renovation fund.

<Certification System>

JICA/OCD (Itagaki): I think it's nice one. Hotels should be included. Good for the tourism industry here.

GSIS (Palanca): We will talk to Dep Ed on this idea.

Mr. Kuwabara and Atty. Maria Obdulia Vitug-Palanca made closing remarks and closed the meeting.

添付資料２　参加者コメントシート

Joint Coordinating Meeting on JICA Study on Insurance Mechanism for Incentivizing Disaster Resilient Public Infrastructures in Metro Manila
March 15, 2017 at GSIS

Comment Sheet

Session 1: Resolve uninsured - underinsurance issues
● In MRT3, what will be used, a valuation of JICA under Arcadis or a third party paid by MRT3 itself (MRT 3, Mr. Art Din). ● Updating appraisal value (No name) ● Does it have to be that Sum Insured must always be based on replacement cost? Can spend value be also used (No name)? ● Define what replacement cost is. Is it the value of reconstruction of the same building at the time of construction? (No name).
Session 2: Risk-based insurance premium pricing
● Correctness of valuation (MRT 3, Mr. Art Din) ● Incentivising government agencies considered to the DRR compliant or certified is a good move/ initiative of the GSIS (No name). ● How will DRR be verified if such retrofit will merit. Risk based insurance premium pricing (No name)?
Session 3: Program to enhance DRR investment
● Retrofitting is suggested (No Name). ● If there are two successive disaster events, especially of the same nature, at which one should be considered (No name). ● No need to create a new special purpose fund. Funds for retrofitting can be changed against/ can be budgeted in the agency's' regular budget or the existing NDRRM Fund. The NDRRM Fund may be used for disaster mitigation and preparedness, and not just be reconstruction or rehabilitation (DBM). ● The proposal committee would not be separate from the proposal inter-agency group on government property insurance -> its function may include the proposal renovation or retrofitting plans (DBM).
Session 4: Recommendations
● Recommendations will rather sure of investing on its own budget for improved works and mandate retrofitting works (No name). ● Replacement cost must be framed and identified (No name). ● There is a ministry 1 Billion (Pesos Fund) now allocated in GAA while the objectives of the study is good and interesting, we should probably start in focusing on how the national agencies and LGUs can access the fund initially (No name).

Other Comments, if any
● Purpose of the study is to reduce the burden of the GOP after a disaster. Support from GOP's importance should be emphasized in the report (OCD-JICA, Mr. Osamu Itagaki). ● What are the procedure to have a building (old) certified to be disaster resilient (No name)? ● Very Innovative (No name)

Thank you for your cooperation !