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URBAN CLIMATE CHANGE ADAPTATION AND RESILIENCE IN METRO MANILA, PHILIPPINES

Bangkok Metropolitan Administration
Bangkok, Thailand
31 July 2017

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UP SURP

Outline

- Philippines (esp. Metro Manila) as disaster prone due to impacts of Climate Change
- Major events on CC related disaster in MM and the Phil
- Major Phil environmental policy response to CC & DRR
- Mainstreaming CCA & DRR into LDP Process
- Building sustainable and CC related disaster resilient Metro Manila

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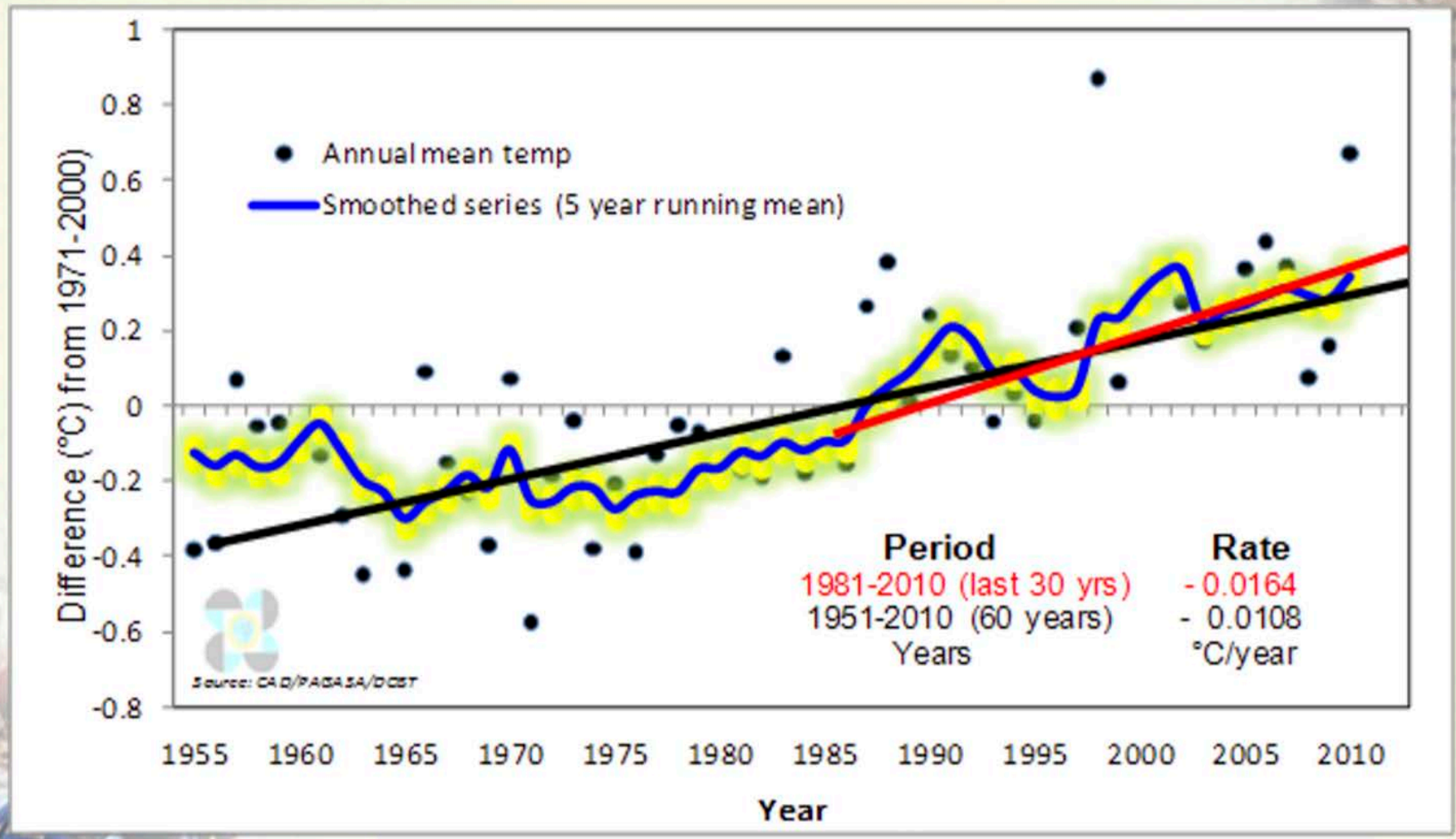
Phil (Metro Manila) as disaster prone due to impacts of CC

2015 Report
Philippines & World Disaster Risk Index

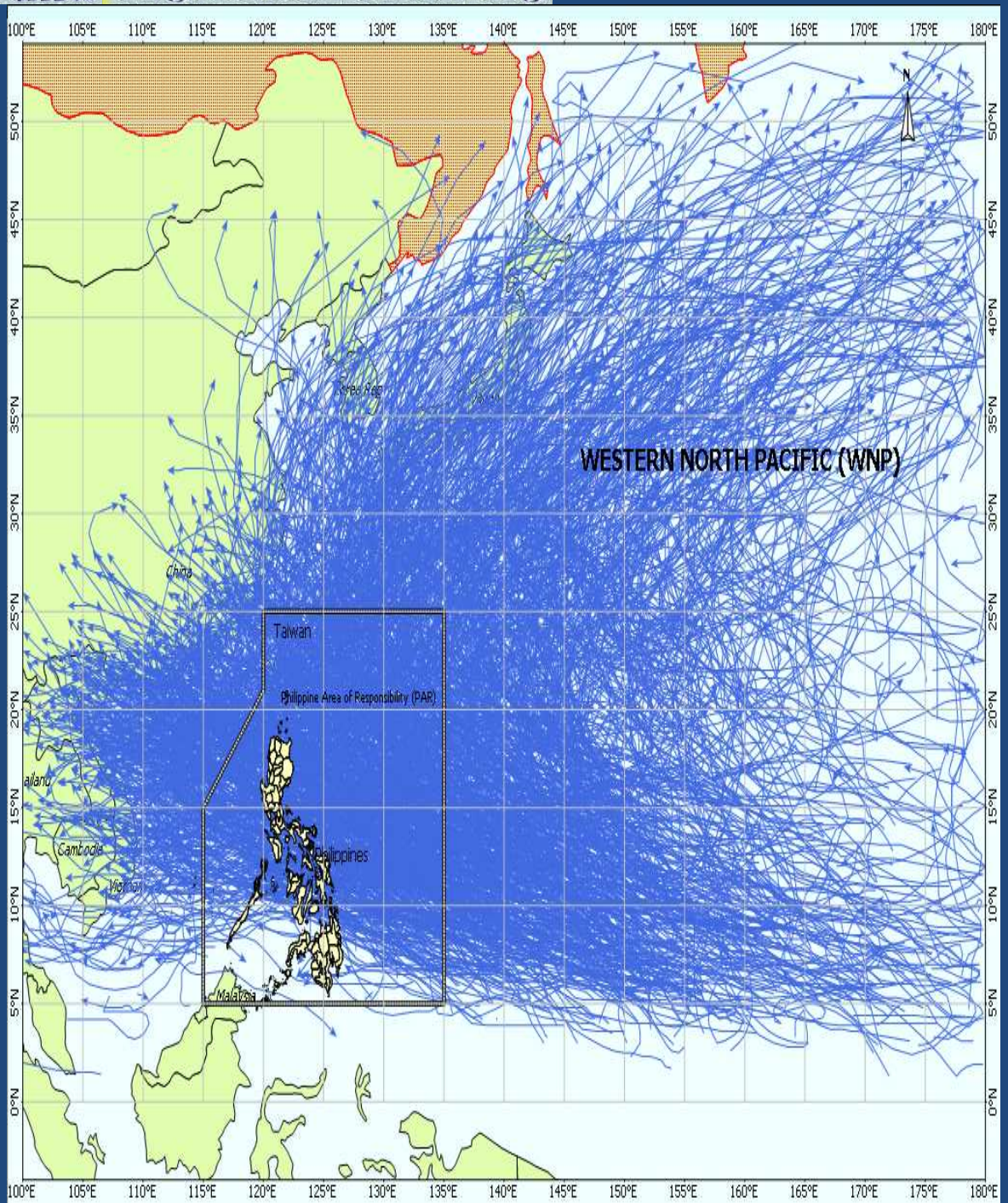
Ranking 2013 (2012)	Country	CRI score	Death toll	Deaths per 100,000 inhabitants	Absolute losses (in million US$ PPP)	Losses per unit GDP in %	Human Development Index[10]
1 (2)	Philippines	2.17	6479	6.65	24538.56	3.82	117
2 (65)	Cambodia	6.67	184	1.22	1495.52	3.24	136
3 (46)	India	12.67	7437	0.60	15147.02	0.22	135
4 (58)	Mexico	15.00	224	0.19	10589.70	0.51	71
5 (143)	St. Vincent and the Grenadines	15.33	9	8.18	96.58	8.33	91
6 (3)	Pakistan	15.50	301	0.16	5419.77	0.65	146
7 (143)	Lao PDR	17.67	23	0.34	263.51	0.83	139
8 (32)	Vietnam	17.83	152	0.17	2397.04	0.50	121
9 (40)	Argentina	20.33	122	0.29	2010.00	0.22	49
10 (16)	Mozambique	21.67	119	0.46	88.21	0.33	178

Philippines mean temperature

Observed Mean Temperature Anomalies in the Philippines (1951-2010)
Departures from 1971-2000 normal values



An increase of 0.65°C from 1951-2010 (60 years)


WESTERN NORTH PACIFIC (WNP)
Philippine Area of Responsibility (PAR)
Taiwan
China
Cambodia
Vietnam
Malaysia
Philippines
N

PAGASA, 2012

Impacts of CC induced Disaster

Changes in Precipitation

Increase in frequency, intensity of typhoons, floods, storm surge, landslides, water-related diseases

Sea Level Rise

- Erosion of beaches
- Inundation of low-lying areas
- Increase risk of flood
- Changes of tides of rivers and bays
- Salt-water intrusion of groundwater

Increase in Temperature

Droughts
Water Shortage
Power Shortage

Metro Manila…Is this the new normal?

Climate Change is a Newsmaker in MM

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Major events on CC related disaster in MM & Phil

ONDOY LOSSES

956 deaths
floods and landslides

86 missing

84 injured

US$ 4.3 Billion
(2.7% of PHL GDP)
damages to crops, property and infrastructure

PHP 4.42 Billion
(2.8% of PHL GDP)
for Rehab & Recovery

249 deaths
from diseases

US$730M losses by housing sector

9.3 million impacted

US$2.34 B
damage to enterprises

US$849.3 M
losses by farmers

Photo

Typhoon Ondoy Impacts

Flooding

Landslides

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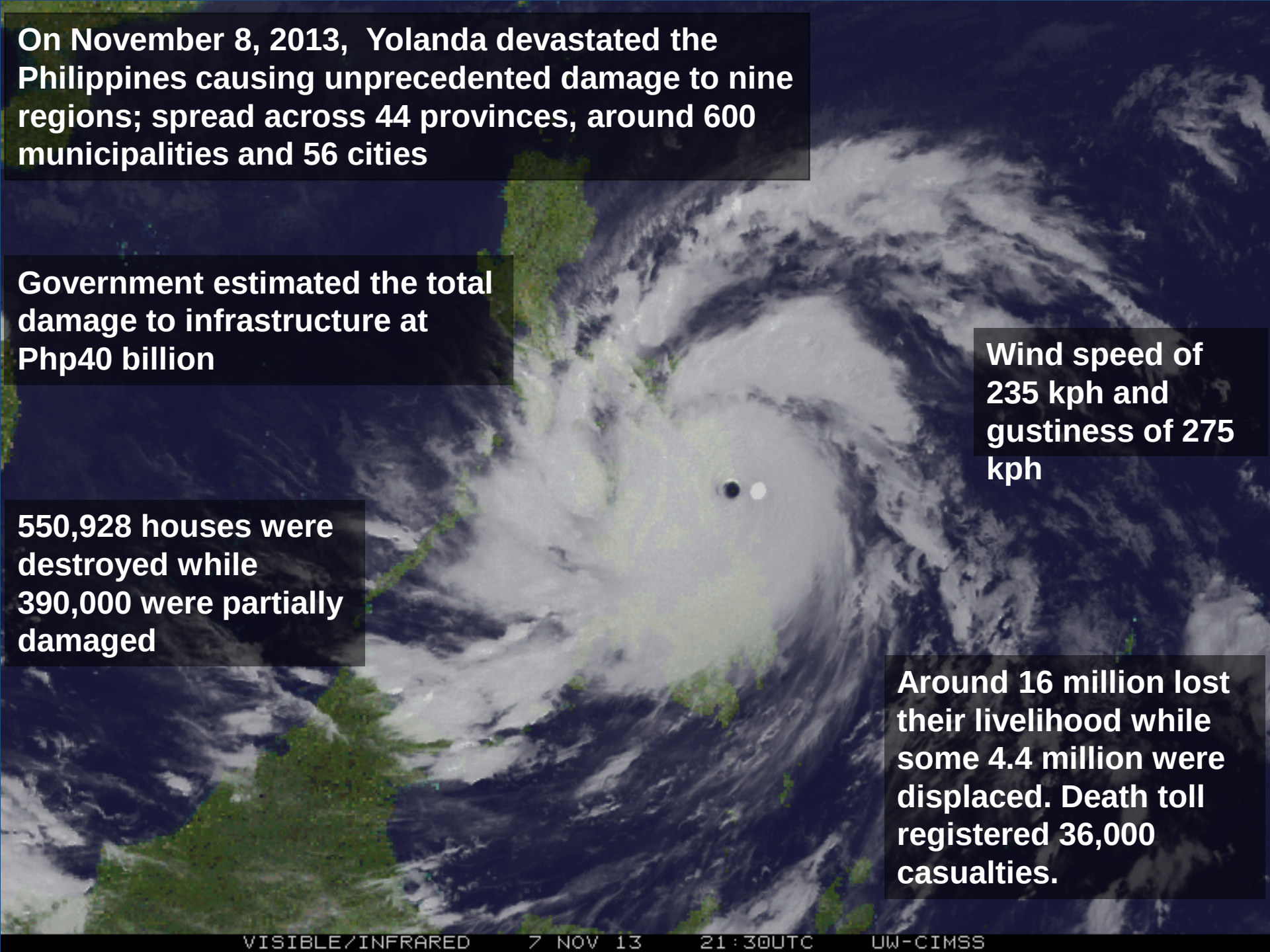
LLDA-CFU


On November 8, 2013, Yolanda devastated the Philippines causing unprecedented damage to nine regions; spread across 44 provinces, around 600 municipalities and 56 cities
Government estimated the total damage to infrastructure at Php40 billion
Wind speed of 235 kph and gustiness of 275 kph
550,928 houses were destroyed while 390,000 were partially damaged
Around 16 million lost their livelihood while some 4.4 million were displaced. Death toll registered 36,000 casualties.
VISIBLE/INFRARED 7 NOV 13 21:30UTC UW-CIMSS

Super Typhoon Yolanda Impacts

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Major Phil environmental policy response to CC & DRR

CC Mitigation & Adaptation

MITIGATION = avoid the unmanageble

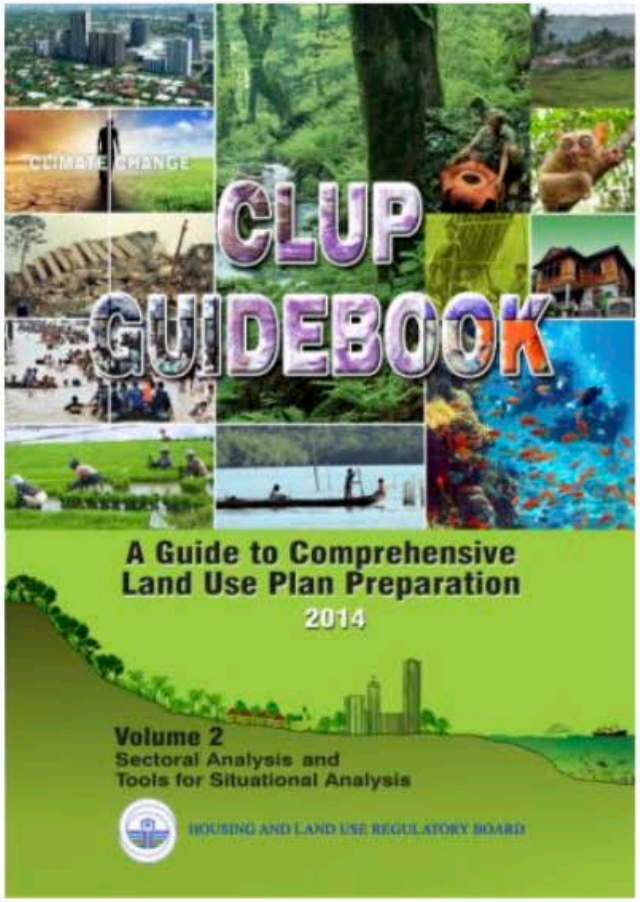
ADAPTATION = manage the unavoidable

Major Policy Response to CC & DRR

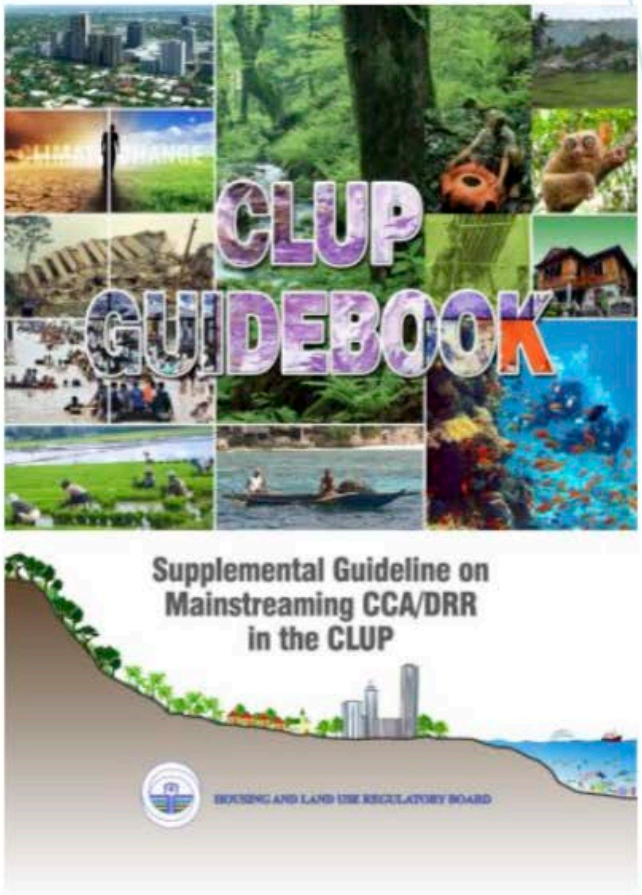
- RA 9729 - Climate Change Act of 2009

- RA 10121 – Disaster Risk Reduction and Management Act of 2010

Supplemental Guidelines on CCA/DRR



Climate Change Adaptation and Disaster Risk Reduction (Volume 2, CLUP Guidebook 2014, HLURB)



Supplemental Guidelines on Mainstreaming Climate and Disaster Risks in the Comprehensive Land Use Plan (Project Climate Twin Phoeni
HLURB/Climate Change Commission/UNDP/

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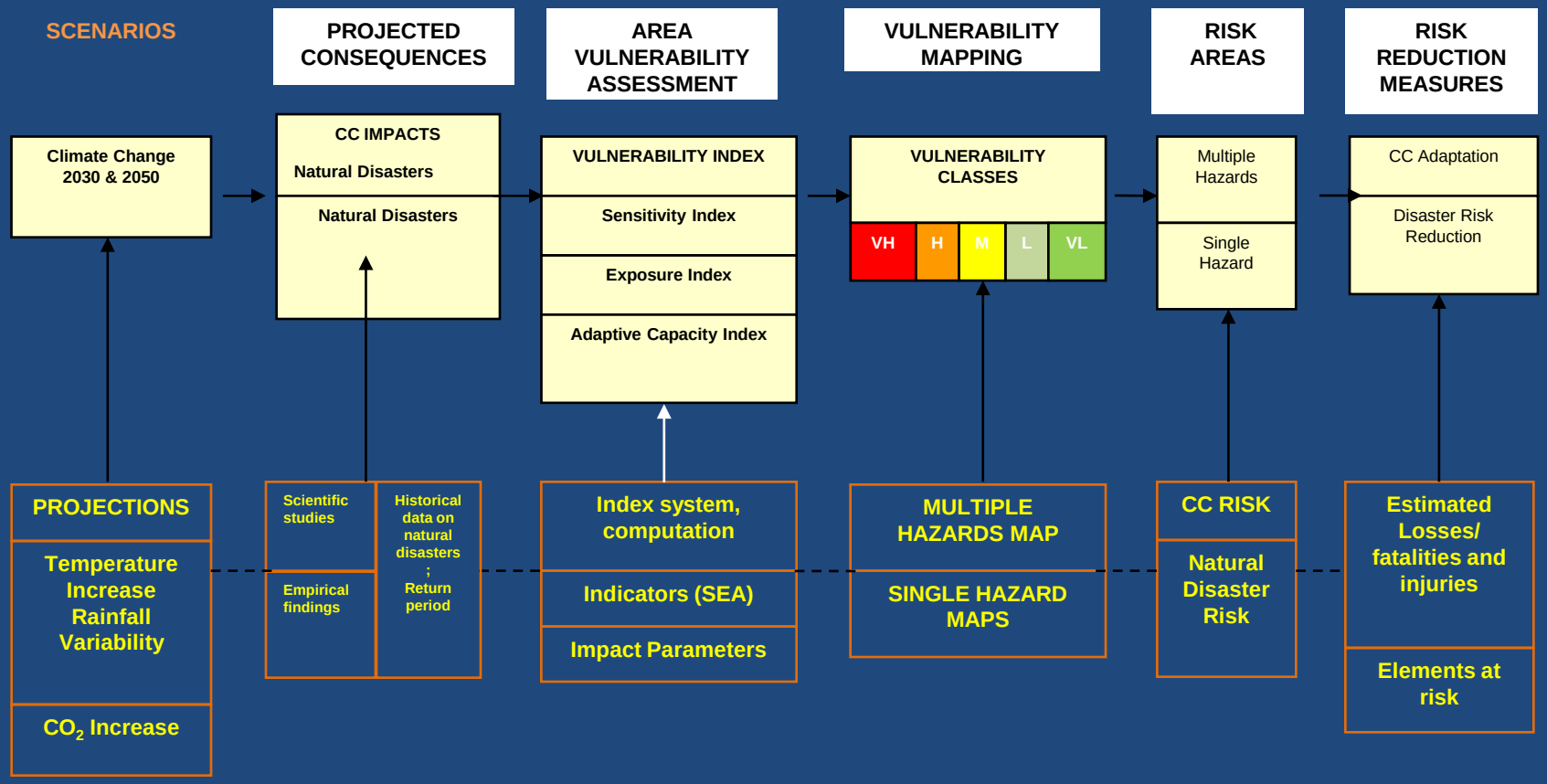
Mainstreaming CCA & DRR into the Local Development Planning Process

MAINSTREAMING FRAMEWORK



Planning Process

SITUATION ANALYSIS
(Climate projections for the city, set future scenarios, identify present and future challenges)

ISSUES AND PROBLEMS:
Identify drivers of vulnerability and prioritize issues

STRATEGIC SPATIAL PLANNING
(Land Use and Resource Development and Management Planning: Development Constraints and Potentials)

PRIORITIZING DEVELOPMENT AND MANAGEMENT PPAs

PRIORITIZING INVESTMENTS
(Area-specific and Project-specific investments)

Cabrido, et al., 2012

Vulnerability Assessment

Vulnerability - degree to which people, property, resources, systems, cultural, economic, environmental, and social activity is susceptible to harm, degradation, or destruction on being exposed to a hazard

$$VA = \frac{Sensitivity \times Exposure}{Adaptive\ Capacity}$$

VA Index Matrix for MM

Impact Parameters	Vulnerability Index								
	Sensitivity indicators (s_i) (Susceptibility)	Rel wt (%)	Opera bility	**Exposure indicators (e_i) (Extent and number)**	Rel wt (%)	Opera bility	**Adaptive Capacity indicators (a_i) (Adaptation measures)**	Rel wt (%)	Opera bility
Flooding	For i =			For i =			For i =		
	1-Rainfall volume		H	1-Extent and number of riverine communities at risk		L	1-Maps of flood prone areas		M
	2-Slope		H						
	3-Proximity to river		M	2-Extent and number of settlements and population in floodplains at risk		L	2-Reforestation efforts		H
	4-Percent forest cover in watershed		H				3-Soil erosion control and soil conservation practices in the watershed		M
	5-Land use in riparian areas and flood plains		M	3-Types and value of physical assets exposed to downstream flooding		L			
				4-Extent of flood prone areas in lowland areas		L	4-Riverbank stabilization efforts		H
				5-Extent of agricultural areas at risk		L	5-Solid waste disposal and management		H
									M
							6-Flood control and drainage facilities in floodplain areas		M
							7-Flood preparedness		H
							8-Warning system and evacuation routes		H
							9-Relocation of high risk population		

Vulnerability Index Matrix for MM

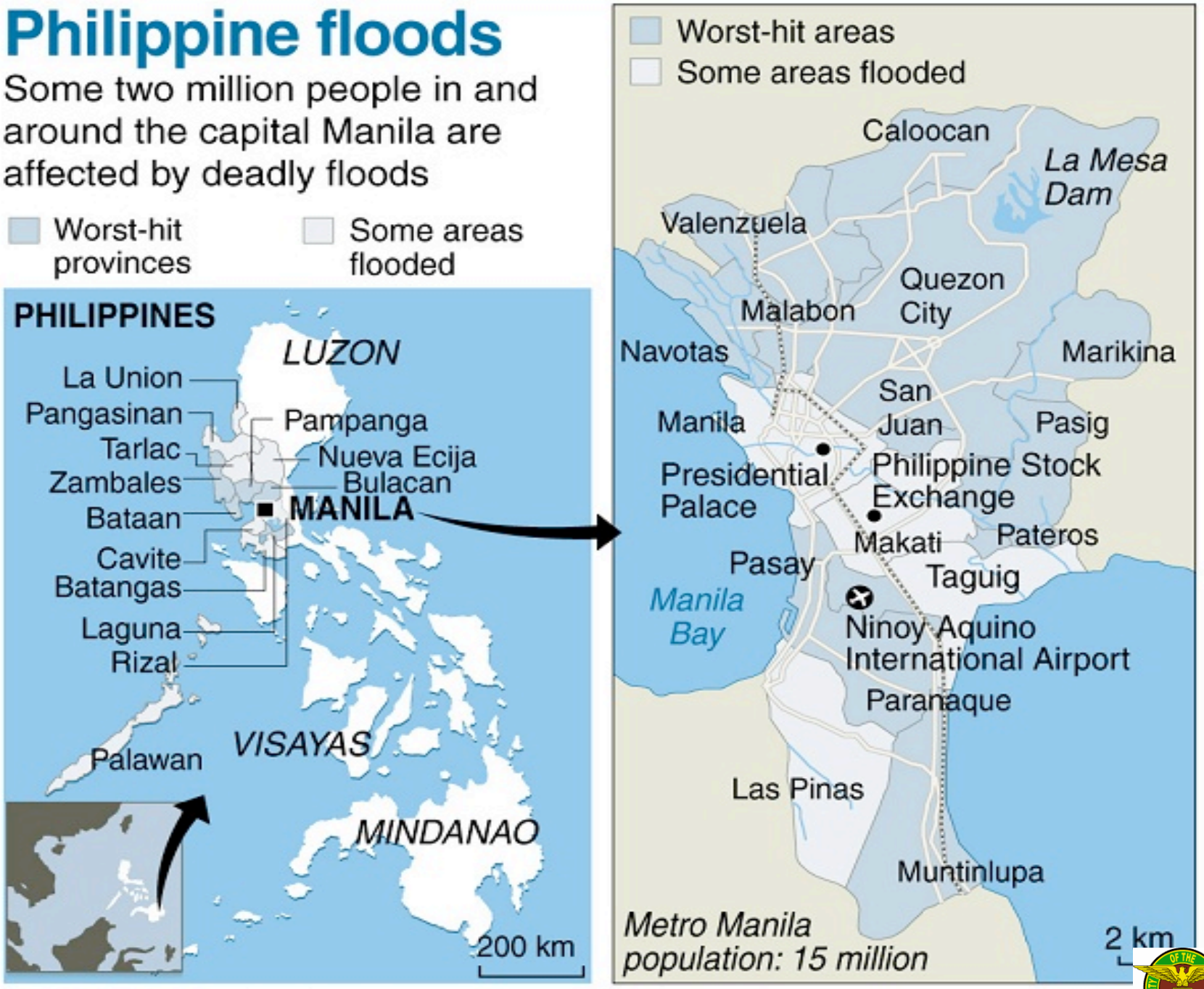
Impact Parameters	Vulnerability Index								
	Sensitivity indicators (s_i) (Susceptibility)	Rel wt (%)	Operability	**Exposure indicators (e_i) (Extent and number)**	Rel wt (%)	Operability	**Adaptive Capacity indicators (a_i) (Adaptation measures)**	Rel wt (%)	Operability
Landslides	For i = 1-Rainfall volume 2-Slope class 3-Distance to fault lines 4-Lithology 5-Frequency of earthquake with intensity of 6 and above in Richter scale 6-Presence of construction activities		H M L L M H	For i = 1-Settlements (number of houses and residents) within and below landslide prone areas (Settlements under high risk) 2-Extent of cultivated agricultural lands below landslide prone areas		L L	For i = 1-Maps on landslide prone areas 2-Awareness of exposed population on landslide risk 3-Relocation efforts by LGU 4-Efforts on stabilization of slopes in landslide prone areas 5-Alert and preparedness system for seismic activity		M L H H M

Vulnerability Index Matrix for MM

Impact Parameters	Vulnerability Index								
	Sensitivity indicators (s_i) (Susceptibility)	Rel wt (%)	Operability	**Exposure indicators (e_i) (Extent and number)**	Rel wt (%)	Operability	**Adaptive Capacity indicators (a_i) (Adaptation measures)**	Rel wt (%)	Operability
Drought	For i = 1-Percent forest cover 2-Land use 3-Incidence of El Nino 4-Rainfall volume 5-Presence of river and streams		 H H M H H	For i = 1-Extent of upland farms and number of families affected 2-Value of crops lost 3-Extent of areas affected by El Nino event		 L L L	For i = 1-Small scale upland irrigation program 2-Water conservation practices adopted		 H L

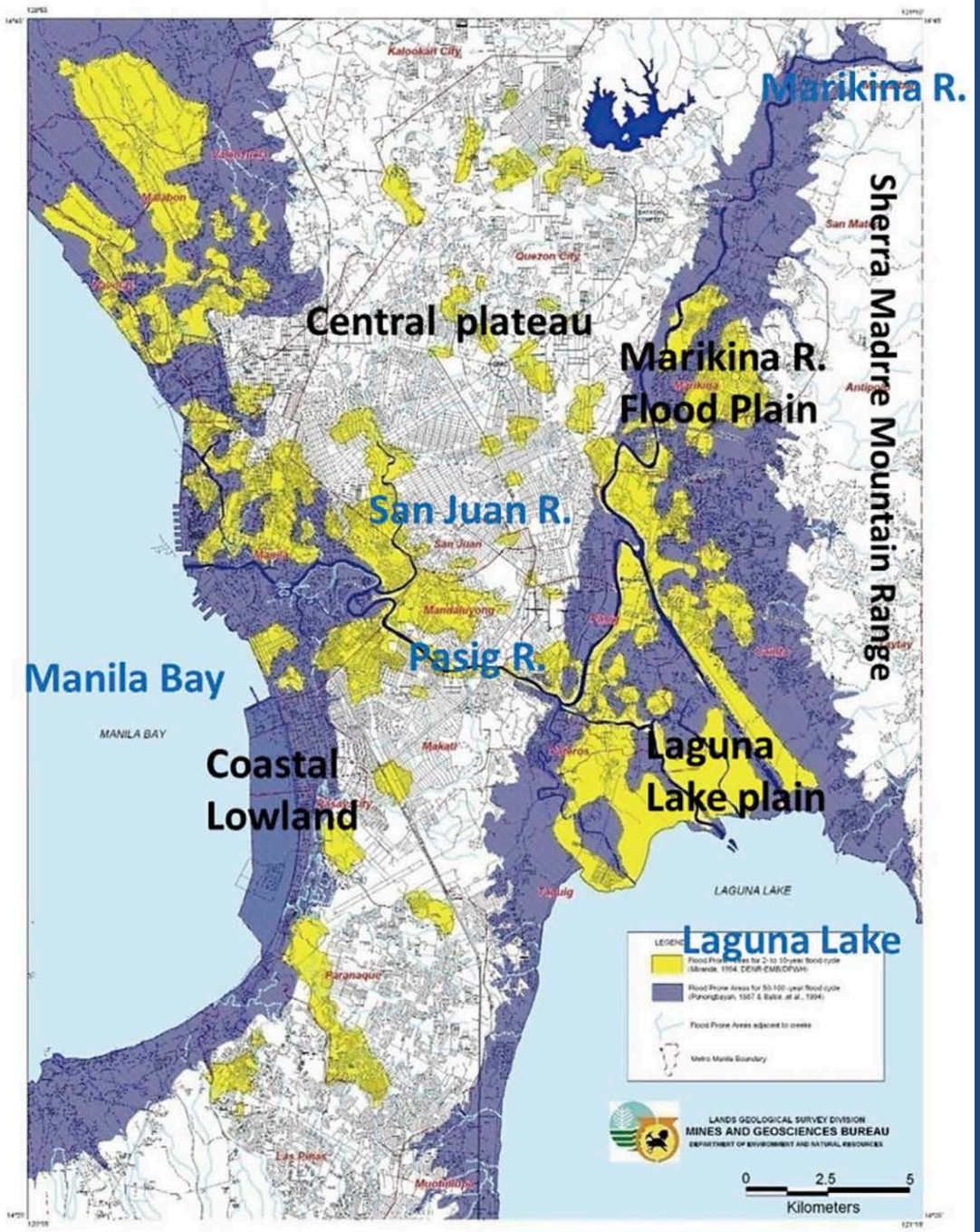
Philippine floods

Some two million people in and around the capital Manila are affected by deadly floods



Source: Metro Manila Flood Control Information Center/NDRRMC

FLOOD HAZARD MAP OF METRO MANILA



DENR-MGB, 2009

Figure 3. 10-meter Low Elevation Coastal Zone in Metro Manila

Tablazon, et al., nd

UP SURP Latest Projects on CCA/DRR

- Roadmap to recovery and reconstruction
- Building sustainable and CC related disaster resilient informal settlement communities
- Planning guidance for CC related disaster response and early recovery thru HLM
- Urban renewal planning for natural disaster prevention responding to CC
- Urban CC and DRR adaptation and resilience
- Capacity building on CCA & DRR in Southeast Asian countries

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Building sustainable and CC related disaster resilient Metro Manila

In Closing...

- The need for science/evidence-based data/info for CCA & DRR resilience
- Participation and consultation are very impt in CCA & DRR resilience
- Emergency response is different from medium to long-term response
- Building resilience to CCA & DRR requires sustained engagement
- More appropriate and long-term funding mechanisms needed; i.e., development, CCA & DRR funds


Ground Zero, Sitio Calacala,
Bgy. Macasandig,
Cagayan de Oro City
Dec. 20, 2011
Addressing the
climate change challenge means
BUILDING A BETTER NATION.

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Thank you

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